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# Hazardous Waste Management in Traditional Oil Mining at Wonocolo Bojonegoro, East Java

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***Abstract:*** ***The oil industry could have a direct and indirect impact on the pollution of water, soil and air. Soils contaminated by oil extraction activities include many complex organic compounds such as alkanes, benzene, methylbenzene and heavy metals. These contaminants are harmful to the health of all life forms, including humans, because they are generally classified as carcinogens. They can not be easily removed from the ground and often these contaminants seep into the groundwater system. This research aimed to find out the management of hazardous waste in traditional oil mining in the village of Wonocolo, Bojonegoro. The research design used descriptive research study with a qualitative approach with 80 workers. Data collection used in-depth interviewing techniques and observations from managers and miners. The results shows that traditional mining in Wonocolo village, Bojonegoro is causing land pollution and air pollution. There is no waste management at the mining site. For liquid waste there is no shelter and is disposed of in sewers but for solid waste is used again as a substitute for fuel.***
***Keyword: waste management, oil mining, traditional mining***

## I. INTRODUCTION

The oil industry could have a direct and indirect impact on the pollution of water, soil and air. Waste management in petroleum activities is essentially aimed at preserving the environment and the possibility of a deterioration of the quality of the environment. Solid waste may be in the form of petroleum sludge, activated sludge, drums of used chemicals, waste, etc. Oil wastes are oil impurities formed during the process of collecting and depositing oil contaminants. Oil waste contains oil, solids, water and heavy metals. These oil wastes are a pollutant that can have negative effects on the environment and must be treated immediately.

Pollution of the environment by compounds of organic oils and heavy metals, highly toxic and relatively easy to access, has become a global phenomenon. Soils contaminated by oil extraction activities include many complex organic compounds such as alkanes, benzene, methylbenzene and heavy metals. These contaminants are harmful to the health of all life forms, including humans, because they are generally classified as carcinogens. They can not be easily removed from the ground and often these contaminants seep into the groundwater system. Village of Wonocolo, Kedewan District, Bojonegoro Regency.An area where Dutch mines once existed and finally used by locals in a traditional way. The community shoots and processes crude oil from the bowels of the earth without the aid of the miner's heavy equipment. Efforts to extract oil and gas using human energy continue without heavy equipment. The lack of modern tools used in the mining industry leads to increased pollution in the environment due to the dispersion of a large amount of oil. Crude oil contamination consists of heavy metals, including Cu, Cr, Cd, Zn and Pb.

## II. METHOD

The type of research used in this study was descriptive research study with a qualitative approach. The population in this study were miners in the traditional oil sector of the village of Wonocolo, Bojonegoro, in East Java are 214 peoples. The number of samples the number of samples needed is 80 workers. The research instrument useda in-depth interviewing techniques and observations from managers and miners conducting traditional mining activities in the Wonocolo mining area, Bojonegoro.

## III. RESULT AND DISCUSSION

### *A. Effect of Hazardous Waste on Traditional Oil Mining in Wonocolo, Bojonegoro*

Wonocolo is one of the sub-districts in Bojonegoro, East Java which has an area of 11.37 km². It lies between Banyu Urip, Kadewan, Ngantru, and Kali Gede in the east, west, south and north. In WonocoloSubdistrict, several crude oil mining activities such as drilling, refining and transportation are operated by local communities. Since the Dutch colonial period in 1942, public mining activities in Wonocolo have been carried out using simple equipment that caused crude oil spills and brought petroleum

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hydrocarbon contamination on the ground. Based on the results of the study, the absence of good management was related to the management of waste products that are still very simple with no appearance of residual liquid waste and gas waste. As for solid waste, it has been used for fuel substitutes. The absence of good management of liquid waste has caused a lot of waste to be scattered on the ground around drilling wells.

The research found the contaminated with sludge and crude oil waste from traditional oil mining as shown in Figure 3.1. There are total 800 oil wells with total 2000 miners. Figure 3.1 shows conventional wells in the research location. Conventional wells still use very traditional tools. Simple tools are very dangerous for miners because the safety equipments are very minimal. The community assembles its own drill. Even though some have used iron, they still use traditional drill tools. The process of traditional oil production is still using a very simple process for oil drilling. Some process used iron drill with compressor for energy drilling.

Figure 3.1. Research Environment

Oil storage (Figure 3.2) was like an ordinary pond. Although, ponds were used as petroleum storage from high-temperature boreholes. But then, oil storage was not very safe. The collected oil products were separated from the mud, water, and crude oil (manually) at the shelter. Water flowed to smaller shelters, mud and crude oil in large crude oil shelters. Then, the separated crude oil was taken and put into the jerry cans which can be seen in Figure 3.2. The movement of oil which was still mixed with mud to the jerry cans uses traditional tools such as bailers and funnel from plastic. Oil production process caused contaminant to the some area. The soil around the crude oil storage pool looks black. During the rainy season, crude oil caused more pollution the surrounding environment.

Figure 3.2. Oil Storage

Most of the plants around the exploration site were teak / Tectonagrandis L. The water conditions were very poor at our study location (Figure 3.3). The water around the site was mixed with waste water from exploration, so the water was polluted. Sanitation at traditional oil mining site the well surrounding sites was very contaminated with crude oil and oil waste from kerosene processing.

Figure 3.3. Water Condition

Mining Method Drilling oil in Wonocolo was still very simple. Traditional drilling, a team of workers was formed. Usually between 15 and 20 petroleum growers. This was needed because in moving the petroleum pump still used human power. Residents around take oil that was in the bowels of the earth with simple tools. Like bucket, pulley, drum, pipe, from artificial wells called well week, etc. But now the method has been replaced with engine power. Can a diesel engine or truck engine that has been damaged. After oil is pumped from the wells, crude oil is brought to the distillation site.

The oil brought from the well was not pure oil, but rather a mixture of mud, soil, water and oil. To be able to become gasoline and diesel fuel, the soil must be edited, while the oil-water mixture must be boiled for 3 to 7 hours in a drum with firewood placed in a ground tunnel. The burning of drums containing Crude Oil produces Steam. Steam of the oil was poured through a pipe, after the steam reaches the end of the pipe, the steam will melt and drip little by little. This process produce diesel oil and kerosene..

*B. Management of Hazardous Waste in Traditional Oil Mining in Wonocolo Village*

Based on interviews with 80 miners in traditional mining, the traditional mining process used traditional tools. The mining process in Wonocolo Village's traditional mining was by taking oil from the shelter using a bailer. Then the oil taken was poured into a bucket and collected in the drum (Figure 3.2). The results of the mining were water, crude oil with kerosene production oil and mud. Whereas the mining water will be disposed of in sewers without being processed (Figure 3.3). Oil contamination caused contamination of water and soil contamination while heavy metal contamination includes arsenic, cadmium, iron, lead, chromium, copper, nickel and mercury.

Figure 3.4 Home Production

The results of the mining were followed by the next process. The oil was boiled until it boils in a closed drum so that the resulting steam flows through the pipe and produces gasoline, diesel and kerosene. The production of crude oil in this traditional mine was sold to Pertamina. Kerosene production was sold to companies around Cepu, Wonocolo, and Bojonegoro. As for the production of diesel fuel, it was sold to communities around the mining area. The rest of the mixture of oil in the form of sediment crust was used as a substitute fuel for charcoal. While the smoke generated from the combustion process was not managed as shown in Figure 3.4.

## IV. CONCLUSIONN

Based on the results of the above research, it can be concluded that effect of hazardous waste produced by traditional mining in Wonocolo village, Bojonegoro on the environment is causing land pollution due to spillage of the rest of the process of crude oil mining and air pollution due to the oil boiling process. The management of hazardous waste produced by traditional mining in the village of Wonocolo, Bojonegoro has not been properly managed. That is, there is no waste management at the mining site. For liquid waste there is no shelter and is disposed of in sewers but for solid waste is used again as a substitute for fuel.

## V. ACKNOWLEIDMENTS

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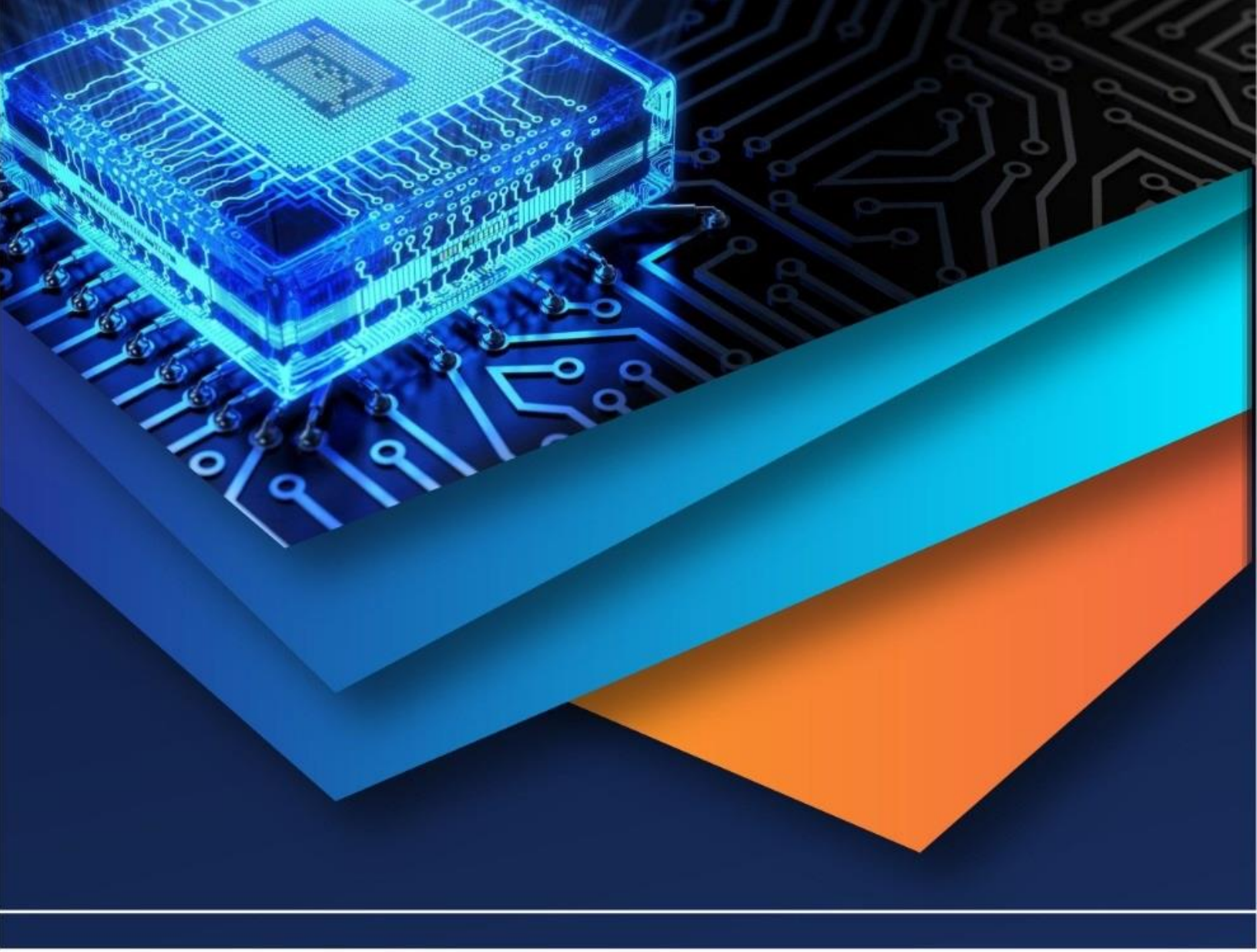

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