

Proper Disposal of PPE — Individual Protective Equipment Contaminated with Chemicals

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Abstract: Regulatory Standard 6 (NR6) defines the PPE — Individual Protection Equipment as any device or product, for individual use used by the worker, for the protection of risks that may threaten safety and health at work. These PPE after use should be disposed of properly as it may contaminate the environment. The objective of this work is to verify through a licensed company for hazardous waste management the number of companies that send their contaminated PPE with chemical products and the type of destination given to this waste. The research was carried out in the city of Ribeirão Preto with a waste management company licensed by CETESB. A questionnaire was sent to the company surveyed, it was verified that from one to ten generating companies in the region send their PPE contaminated with chemicals and that the destination is an option of the client to agree with the costs generated by each type of final disposal, being the most economical class I landfill destination is carried out by 80% of the generating companies. The 20% of the generating companies cost the final destination of their EPI contaminated with chemicals to the licensed co-processing company that are 300 kilometers. We conclude inspection measures to companies that generate these types of waste to verify the real destination of PPE contaminated with chemicals, as well as measures that accelerate the installation of other types of final disposal processes such as incinerators and co-processing in the city of Ribeirão Preto.

Key words: individual protection equipment, chemical, landfill class I, co-processing

1. Introduction

The Portaria n^o 3.214 published in 1978, which regulated the pertinent regulations for Occupational Safety and Health, in its Regulatory Rule 6 (NR6) defines the Personal Protective Equipment - PPE as any device or product, of individual use used by the worker, intended for protection of risks likely to threaten safety and health at work [1].

PPE after use should be properly disposed of as it may be contaminated with agents likely to contaminate the environment, so companies should create a Solid Waste Management Plan, as determined by Law 12,305 of 2010, which deals with the National Waste Policy Solids.

Many chemicals are present in the operations of companies that may be present in the PPE used by workers such as greases, solvents, acids, bases, paints, among others. Disposal of these chemical-contaminated PPE should follow some standards intended to ensure that such materials do not cause damage to the environment [2].

Another relevant regulatory standard for Occupational Safety and Medicine regulated by Portaria 3.214 and Regulatory Standard 25 (NR25) which describes industrial waste. This standard establishes that industrial waste must be disposed of in the workplace by appropriate methods, equipment or measures, and any contaminants which could compromise the safety and health of workers should not be released or released into the working environment. It also determines that these industrial solid wastes as well as high toxicity and hazardous solid wastes are treated and disposed of properly in

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accordance with relevant federal, state and municipal legislation. Therefore, companies that generate PPE contaminated with chemical products must give adequate disposal to these wastes, and these are subject to inspection and assessment by competent bodies.

According to NBR 10004: 2004, which deals with the classification of solid wastes, PPE contaminated with chemicals are classified as Class I waste or hazardous waste. These waste present a hazard, in other words public health risk or risk to the environment, or one of the characteristics flammability, corrosivity, reactivity, toxicity and pathogenicity. Therefore, these wastes should be sent to the final destination.

There are several types of final destination suitable for class I waste as the class I industrial landfill with a structure capable of minimizing the risks of groundwater contamination. These types of landfills have double waterproofing system with HDPE (high density polyethylene) blanket, protecting the soil and groundwater sheets. Another is incineration which consists of a process where the decomposition through contact of the residue with oxidation by the high temperature that can go beyond 950 °C will destroy the organic fraction of the residue through the incineration of chemical residues, considerably reducing its volume. Co-processing is another suitable final destination. This consists of the thermal destruction of waste in cement kilns. Due to high temperatures and residence time, the wastes are 100% destroyed. The burning takes place under strictly controlled conditions. These residues can be sent to cement kilns licensed for clinker production. Another is the shielding plants where the waste contaminated with chemicals are totally mischaracterized and mixed next to the other residue in order to produce a liquid mix or solid with high calorific value (blend). The blends are stored and then transported to the co-incineration units [3].

Organizations of all kinds are increasingly concerned with achieving and demonstrating correct environmental performance by controlling the impacts of their activities, products and services on the

environment. To meet this environmental performance, companies search environmental certification. The system based on ISO 14001 is one of the most widely adopted environmental management models in the world by companies. It is a certifiable reference in the form of requirements which requires a series of procedures and initiatives from certified companies, thus requiring that environmental laws be complied with. The overall purpose of this Standard is to balance environmental protection and pollution prevention with the socioeconomic needs of certified enterprises. [4].

Brazil had more than 4,000 companies certified with ISO14001 being the highest concentration of certifications in the Southeast region, followed by the South, Northeast, North and Midwest regions. The sectors with the highest number of environmental certifications are services, automotive, metallurgy and chemical [5].

The objective of this work is to verify through a licensed company for hazardous waste management the number of companies that send their contaminated PPE with chemical products and the type of destination given to this waste.

2. Material and Methods

The Metropolitan Region of Ribeirão Preto (RMRP) was institutionalized by Complementary Law n 1,290 in 2016 and gathers 34 municipalities. The region has a diversified economy, the sugar and alcohol mills represent the main economic activity of the region together with the agricultural machinery and equipment sector, also the orange juice, coffee, soybean, peanut, fertilizer and other agribusinesses [6].

The city of Ribeirão Preto has three companies that manage hazardous waste. The research was conducted in one of this waste management company licensed by CETESB - Environmental Company of the State of São Paulo.

The research had a questionnaire sent to the company being researched and answered by the

environmental engineer manager of the waste management area.

The research company located in the city of Ribeirão Preto serves eight cities in the region, has an area for the storage of class I waste, built on the basis of NBR 12.235 - Storage of Hazardous Solid Waste, capable of storing solid and liquid waste. It also has its own fleet for the transportation of waste, from the generating company to the licensed transshipment area for the reception and storage of the waste until its final destination. This fleet has the CIV — Vehicle Inspection Certificate and CIPP — Inspection Certificate for Hazardous Products and the drivers are trained with MOPP — Operational Movement of Hazardous Products and other training.

The company has partnerships with other companies licensed to carry out the final disposal of the waste by sending a generating waste certificate to the generating company each month, proving the adequate shipment of the hazardous waste to the appropriate final destination.

3. Results and Discussion

According to the result of the questionnaire sent, the company surveyed receives PPE contaminated with chemicals from one to ten companies and some of these companies belong to the region of Ribeirão Preto.

It is noticed that these companies that send their EPI contaminated with chemicals have a concern with the final destination of their waste and a large part carry out this operation because they have environmental certification.

Regarding the final disposal appropriate to the PPE contaminated with chemicals according to the result of the questionnaire the company researched, it was verified that this destination is an option of the client to agree with the costs generated by each type of final destination, being the destination in landfill class I more economical than the referral of this residue to coprocessing, which is a much more expensive final destination. It is worth remembering that the region of

Ribeirão Preto does not have a licensed company for incineration and co-processing there is only a licensed company for this type of final disposal of hazardous waste at 300 km, and therefore this type of final disposal process is much more costly for companies generating these PPE contaminated with chemicals.

The region of Ribeirão Preto has a company that has a licensed class I landfill, to which the company researched forwards these contaminated PPE with chemical products, so the final destination of these wastes to this type of process becomes more economic for the generating companies being, therefore carried out by 80% of these generating companies. The remaining 20% of these generating companies cover the final destination of their chemical-contaminated PPE to the licensed co-processing company.

Data from the Brazilian Solid Waste Survey of 2014 shows that industrial waste is sent to final disposal, with 10.4% being sent to class I landfills, 14.3% sent to industrial incinerators, 7.1% to waste blending for co-processing, and 21% are sent to cement industries licensed for co-processing and 10.4% are sent to other technologies [3].

4. Conclusion

It was verified that the company researched in this work provided data to understand the number of companies that send their contaminated PPE with chemical products for final destination and the types of final destination existing in the region of Ribeirão Preto as the class I landfill and other destination processes such as existing co-processing at 300 km and the absence of licensed incinerators. It is concluded that because it is a region that covers many municipalities, the amount of companies that are concerned with the final destination of their chemical-contaminated and small PPE due to the number of companies licensed for this purpose, companies that generate these types of waste to verify the real destination of PPE contaminated with chemicals, as well as measures that accelerate the installation of other types of final

disposal processes such as incinerators and co-processing in the city of Ribeirão Preto.

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