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Janusz Zemanek, Andrzej Woźniak, Mateusz Malinowski

THE ROLE AND PLACE OF SOLID WASTE TRANSFER STATION IN THE WASTE MANAGEMENT SYSTEM

Summary

The municipal waste is a waste type that includes predominantly household waste (domestic waste) with sometimes the addition of commercial wastes collected by a municipality within a given area. EU waste management principles were defined in the Waste Framework Directive 75/442/EEC.

A transfer station is a building or processing site for the temporary deposition of waste. Transfer stations are often used as places where local waste collection vehicles will deposit their waste cargo prior to loading it into larger vehicles. The primary reason for using transfer station is to reduce the cost of transporting waste to disposal facilities. There are many countries in Europe using this solution in waste management system, for example: Germany, Belgium, Austria, Netherlands, Denmark, Sweden, Norway, Finland. Waste transfer stations play there an important role in a community's total waste management system, serving as the link between a community's solid waste collection program and a final waste disposal facility. In Poland only several waste transfer stations exist, but none of them fulfils the role like this station located in EU or United States of America.

This article includes characteristics and role of solid waste transfer stations (located mainly at rural area) in waste management systems.

Key words: municipal solid waste, solid waste transfer station, waste management

INTRODUCTION

Municipal solid waste (MSW) is generated by households, businesses and institutions. MSW typically contains a wide variety of materials including discarded containers, packaging, food wastes, and paper products. MSW includes a mixture of putrescible (easily degradable) and nonputrescible (inert)

materials. Amount of generated municipal wastes depends on many factors, of which the most important are: life standard, population's rate and goods' consumption scale and intensity. The kind of produced wastes depends on the area where the wastes are generated, population density, bulding types, objects of public utility, trade outpost magnitude and intensity of industry and services [Malinowski, 2009a].

In the EU-27 (all united countries), 522 kg of municipal waste was generated per person in 2007. Municipal waste can be treated in several ways: landfilling, incineration, recycling or composting. In the EU-27 in 2007, 42% of treated municipal waste was landfilled, 20% incinerated, 22% recycled and 17% composted [Malinowski, 2009b]. The highest share of municipal waste was recycled in Germany, Belgium and Sweden.

The treatment methods differ substantially between Member States. In 2007, the Member States with the highest share of municipal waste landfilled were Bulgaria (100% of waste treated), Romania (99%), Lithuania (96%), Malta (93%) and Poland (90%). The Member States with the highest recycling rates for municipal waste were Germany (46%), Belgium (39%), Sweden (37%), Estonia and Ireland (both 34%). Composting and recycling accounted for over 50% of municipal waste treated in Germany (64%), Belgium (62%), the Netherlands (60%) and Austria (59%) [Corselli – Nordblad, 2009]. In 2006 the USA landfilled 54% of MSW, incinerated 14%, and recovered, recycled or composted the remaining 32% [EPA, 2008].

Environmental problems resulting from unsafe and inadequate waste management also still exist in the EU Member States. In addition, negative news items regularly appear which show that waste management will surely remain on the environmental policy agenda. Accurate supervision and precise information on waste management are necessary. The legacy of inadequate waste management exemplified by dangerous dumping sites still results in human health and ecological problems [Municipal…, 2002]. Waste management problems in the new countries are extreme compared to the EU-15. The EU-15 countries were able to slowly develop their capacities to treat and dispose of waste in an adequate way and, in addition, they have developed strategies for waste prevention, strongly supported by the Commission. Building solid waste transfer station or recycling centre becomes practical solution to wastes problem.

There are hundreds of epidemiological studies reported on the incidence of a wide range of possible illnesses on employees of waste facilities and on the resident population living near landfill sites, incinerators and composting facilities. There is convincing evidence of a high risk of gastrointestinal problems

associated with pathogens originating at sewage treatment plants. These kinds of health problems are not noticed near recycling centres and similar buildings [Giusti, 2009].

WASTE TRANSFER STATION – CHARACTERISTIC AND ROLE

A solid waste transfer station is a facility with a designated receiving area where waste collection vehicles discharge their loads. The waste is often compacted, then loaded into larger vehicles (usually transfer trailers, intermodal containers, railcars and barges, variety rail and water roads) for long-haul shipment to a final disposal site – typically a landfill, waste-energy plant, or a composting facility. No longterm storage of waste occurs at a transfer station; waste is quickly consolidated and loaded into a larger vehicle and moved off the site, usually in a matter of hours [Municipal…, 2008]. Waste transfer stations play an important role in a community's total waste management system, serving as the link between a community's solid waste collection program and a final waste disposal facility.

New standards in national plans of waste management in EU include design, operating, and monitoring requirements that significantly add to construction, operating, closure, and post-closure monitoring costs. As older landfills near urban centres reach their capacity and begin closed, cities must decide whether to establish new landfills or to seek other disposal options. Many communities find the cost of upgrading existing facilities or constructing new landfills to be prohibitively high, and want to close existing facilities. For these communities, good solution is building new objects like recycling centre, waste transfer station and incinerators. Moreover, transferring waste to a large regional landfill is an interesting alternative [Zemanek, 2009].

The large regional landfills and another ecologistic objects are optimally located within a reasonable driving time from the service area's largest concentration of homes and businesses. For example, a rural waste transfer station could be located near one of the service area's larger towns and sized to take waste from all waste generators within about 30 km. As an example, two 50-ton-per-day transfer stations might each serve five ten small communities [Zemanek, 2010]. In many communities, citizens have voiced concerns about solid waste transfer stations that are poorly located and designed, or operated. In addition, some citizens might feel that transfer stations are disproportionately concentrated or located too near their communities. However, transfer stations play an important role in a community's waste management system.

The primary reason for using transfer station is to reduce the cost of transporting waste to disposal facilities. Consolidating smaller loads from collection vehicles into larger transfer vehicles reduces hauling costs by enabling collection crews to spend less time travelling to and from distant disposal sites, and more time collecting waste. This also reduces fuel consumption and collection vehicle maintenance costs, and produces less overall traffic, air emissions, and road wear. In addition, a transfer station also provides [Waste…, 2002]:

– an opportunity to screen waste prior to disposal,
– flexibility in selecting waste disposal options,
– an opportunity to serve as a convenience centre for public use.

At many transfer stations, workers sort incoming wastes on conveyor systems, tipping floors, or in receiving pits. Waste sorting system has two the principle task:

– separating recyclables from the waste stream,
– identifying any wastes that might be inappropriate for disposal (e.g., hazardous wastes or materials, white goods, whole tires, auto batteries, or infectious waste).

Identifying and removing recyclables reduces the weight and volume of waste sent for final disposal and, depending on local recycling markets, might generate revenue. Sorting for inappropriate wastes is more efficient at the transfer station than at the landfill.

Waste transfer stations also offer more flexibility in terms of disposal options. Decision makers have the opportunity to select the most cost-effective and/or environmentally protective disposal sites, even if more distant. They can consider multiple disposal facilities, secure competitive disposal fees, and choose a desired method of disposal (e.g., landfilling or incineration). Finally, transfer stations often include convenience centres open to public use. These centres enable individual citizens to deliver waste directly to the transfer station facility for ultimate disposal. Some convenience centres offer programs to manage yard waste, bulky items, household hazardous waste, and recyclables.

The majority of municipal wastes are accepted on transfer station. The following types of wastes are typically not accepted at transfer stations: infectious medical waste, hazardous waste, explosives, radioactive materials, fuel tanks (even if empty), appliances, dead animals, asbestos, liquids, sludge and dustprone materials. This is a general list, some transfer stations might be set up to process these wastes, while others might have a longer list of unacceptable materials.

The physical size of a planned transfer station is typically determined by the following factors:

– the amount of waste generated in delivering area,

– hourly or daily arrival patterns of customers delivering waste,

– the types of vehicles delivering waste (car or pickup truck and specially designed waste- hauling truck),

– the types of wastes be transferred on station,

– the availability of transfer trailers, intermodal containers, barges and how fast these can be loaded,

– the size of the service area and buffer space.

Figure 1 shows a simplified example of a site design plan of a fully enclosed transfer station.

Number and size of transfer stations are determined by the maximum distance from which waste can be economically delivered to the transfer station (25 – 30 km). The area from which the waste transfer station can be reached determines the volume of waste that must be managed, which is the facility's initial design capacity. Beyond a certain distance, another transfer station might be necessary, or it might become just as cost-effective to direct haul to the disposal facility [Zemanek, 2010].

Every transfer station should contain, beyond roadways, queuing areas and car parks, the following buildings:

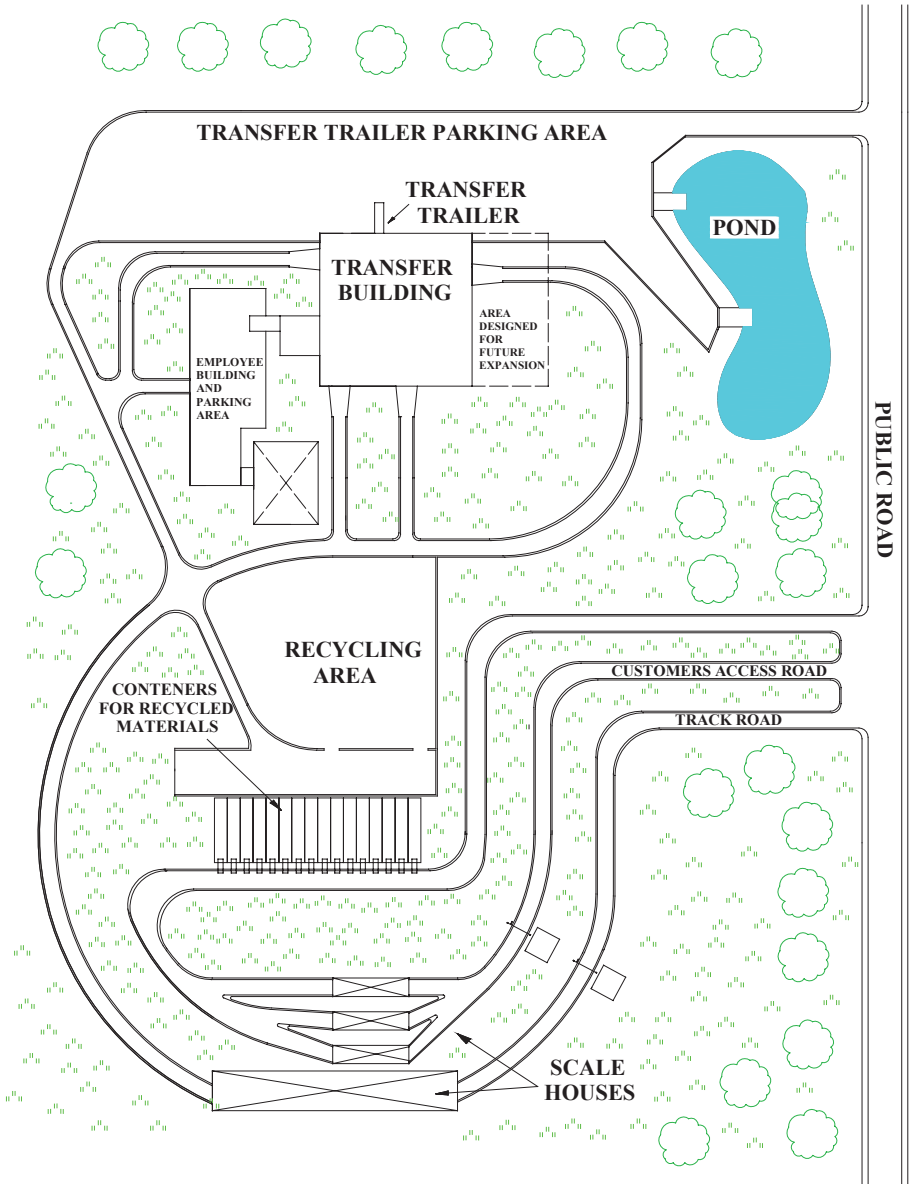
– main transfer building (and space for future expansion of the main transfer building) - where cars and trucks unload their waste onto the floor, into a pit, or directly into a waiting transfer container or vehicle. Very often the main transfer building is quite tall to accommodate several levels of traffic (Figure 2 shows the main transfer building),

– the scale - every incoming and outgoing loads is weighed and fees are collected there,

– recycling area,

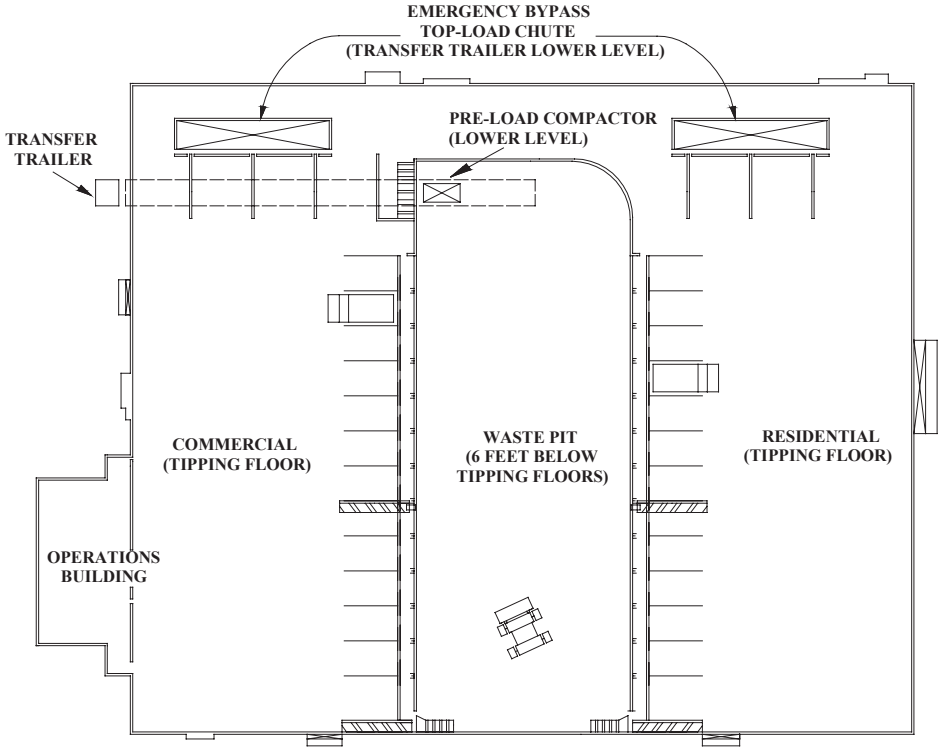
– employee building,

– buffer areas.



Source: Own study according to Waste transfer … [2002].

Figure 1. Typical waste transfer station site plan



Source: Own study according to Waste transfer … [2002].

Figure 2. Typical main transfer building floor plan

PLACE OF WASTE TRANSFER STATION IN POLISH WASTE MANAGEMENT SYSTEM

In Poland and many European countries landfilling wastes unfortunately will in the future leading form of neutralizing them. Today many landfills in Poland do not fulfill European requirements, moreover many of them will be soon closed. Waste incinerators seems to be the best accessible alternative to landfill . Unfortunately, the main obstacle is still the lack of concrete model of payments for transportation and neutralizing the wastes, and aspect of society resistance.

In the coming time at every commune in Poland common points of accumulation municipal wastes should start up. Small populations are not able to match this requirement. As a consequence, the distance between the point of accumulation and place for final waste disposal will increase. The ideal solution

for these regions or communes is and will be just an additional element of the system – a waste transfer station, where the system of container loading depends on infrastructure (road service, railway or water route). This system works very well on German, Denmark and USA waste markets.

CONCLUSIONS

Many transfer stations provide public access to facility rather than restricting access only to waste collection vehicles. The types of customers accommodated variety depend on the facility location and the transfer station owner. Publicly managed transfer stations are more likely open to public use. Private transfer stations might not be open to the public, because residents deliver relatively small waste amounts, require better security and organization conditions and generally pay relatively small fees for using the transfer station.

Development of solid waste transfer stations in EU can minimize environmental impacts; it involves careful planning, designing, and operation. Design and operational issues regarding traffic, noise, odours, air emissions, water quality and waste are always discussed with society. Proper facility sitting, design, and operation can address and mitigate these potential impacts on the surrounding natural environment.

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Andrzej Woźniak, Ph. D, Dr Sc.
Janusz Zemanek, Ph. D
Mateusz Malinowski, Mgr inż.
Uniwersity of Agriculture in Cracow
Instytut Inżynierii Rolniczej i Informatyki
30-149 Kraków ul. Balicka 116B
tel. (012) 662 4660
jzemanek@ar.krakow.pl
mateuszmalinowski1985@o2.pl
awozniak@ar.krakow.pl

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