Waste Transfer Stations

WTS

APPLICATION OBJECTIVE

To aggregate single amounts of waste delivered from collection vehicles to larger quantities and reload them for a long distance transport on other means of transportation

WASTE TYPES

Mixed household waste		Glass
Paper/ paperboard		Wood waste
Scrap metals		Biowaste
Biowaste		Bulky waste incl. electronic & household appliances
Light-weight packaging		C&D waste
Branch specific waste	*Especially solid waste*	Waste tyres
Other waste materials	*Especially solid waste*	

SPECIAL CHARACTERISTICS AND REQUIREMENTS OF THE APPLICATION

PRETREATMENT OF THE INPUT MATERIAL:

As a general rule no pre-treatment of the input is necessary. It can prove useful to reduce the size of some waste material, e.g. bulky waste, to attain an efficient usage of the available transportation volume, however. Municipal waste often gets reduced in size by the compaction unit in rear end refuse collection vehicles already.

OPTIONS FOR THE UTILISATION OF THE OUTPUT:

Crushing the input may complicate a high quality separation and recycling of valuable materials later on.

RESTRICTIONS OR INFLUENCE OF EXTERNALITIES ON THE APPLICATION

INFRASTRUCTURAL CONDITIONS:

The location of a transfer station must be generally well accessible for different types of vehicles and means of transportation and should preferably be situated near (or in a central position) to the principal points of waste generation. There must be a sufficient infrastructure (e.g. electricity) with enough space for driving manoeuvres and to ensure that loading/unloading procedures can be safely carried out. There shall be a limited vulnerability of the location to be affected from extreme weather conditions (blocked roads, steep roads, flooding etc.)

CLIMATIC CONDITIONS:

For reasons of reduced emissions and to protect the waste from weather effects waste transfer stations are normally set up in halls or under shelters, especially where a press is installed and open reloading of the waste would otherwise have to take place.

TECHNICAL DETAILS

GENERAL OVERVIEW

Abstract

Waste transfer stations are technical facilities set up for accumulating and reloading the waste from collection trucks onto larger container and long-distance transport vehicles for shipment (by road, railroad or ship transportation) to treatment or disposal facilities. By combining the loads of several individual waste collection trucks into a single shipment, municipalities can save money on the labour and operating costs of transporting the waste to a distant disposal site. The waste transfer makes particular sense when the place of treatment, the disposal site or recycling facilities is in such distance from the collection area that the costs for the transportation of the waste with the collection vehicles exceed that for the reloading and the transportation with long

distance vehicles. Some reloading arrangements can be combined with a compression or baling of the waste to further optimise the transport. That way the total number of vehicular trips travelling to and from the disposal site can be further reduced.

Basic requirements

- A waste transfer station as an environmentally relevant activity because of its potential to cause environmental burdens and nuisance will require an environmental authority licence.
- Waste transfer stations must have a connection to the relevant transport routes and should have a sufficient infrastructure and be located in a central position to the collection areas.

Specific advantages

- Collection vehicles can be used more effectively due to the minimisation of transport distances for the collected waste
- Overall transportation of the waste from the collection point to the place of utilisation or final disposal becomes more reasonable due to increased transportation efficiency (higher loads) moreover the waste transfer can help reduce the impacts of trucks traveling to and from the disposal site

Specific disadvantages

- Erection and operation of a waste transfer station consumes additional resources and costs.
- Waste transfer stations can cause an increase in traffic in the area where they are located. If not properly sited, designed and operated they can cause burdens and nuisance for their neighbourhood

APPLICATION DETAILS

Technical scheme

Waste transfer stations can be of different technical arrangement. Some essential criteria which determine the arrangement used are:

- Type of vehicles delivering the waste and type of vehicles picking them up
  - vehicles with swap body container or fixed superstructure
  - other means of transportation such as for rail transport or ships
- Reloading with and without compression of the waste material
  - A compression of the waste can be done in a stationary press before the waste is reloaded to the means used for long distance transportation or within the same.

The simplest arrangement for a waste transfer station is a plain area where swap body containers can be transferred from waste collection trucks to long-distance vehicles. There are different swap body systems existing so that the reloading between the different vehicles can either be done without additional technical support or with the help of cranes, ramps, etc. only.

Vehicles with a fixed superstructure must be first unloaded at the transfer station. This applies also for swap body containers if they are not directly reloaded from the delivering vehicle to the long-distance transporter. Unloading of the waste can be done on a plain ground from where wheel loaders, conveyor belts or excavators take them up and reload the material into the long-distance transporter. Another way of unloading is via ramps from where the collection trucks discharge the waste directly onto the bed of the long-distance transporter, into open containers or the feeding chute of a press.

Following hereafter are some schematical examples of reloading processes in waste transfer stations:

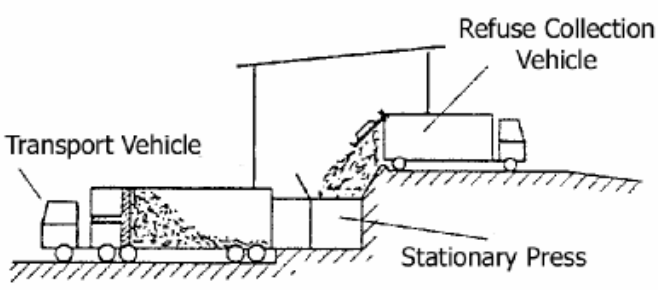

Figure 1: Direct truck to truck transfer with compression of the waste for long-distance transportation

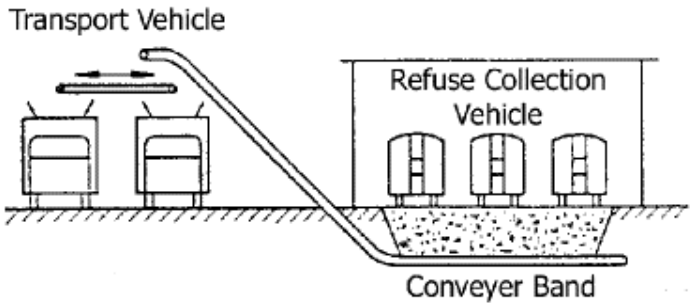

Figure 2: Broken transfer via a conveyor attached to a deep bunker for the accumulation and temporary storage of the waste

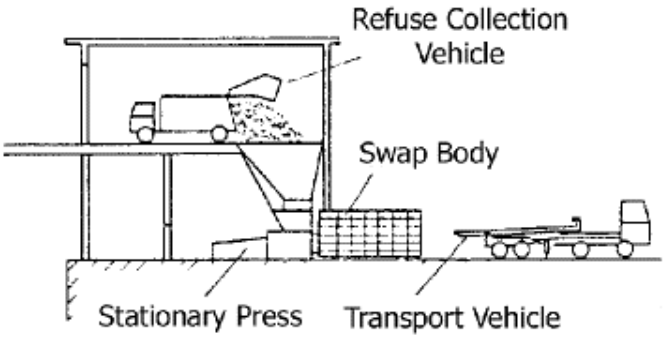

Figure 3: Waste transfer via a delivery ramp and with the compression of the waste and reloading into a container for long-distance transportation

Reloading into railroad transporters or ships works principally in the same way like truck-to-truck transfers, except that the transfer station needs to have a connection to the railroad system or waterways. This also applies to the place of final destination. The waste amounts for railroad or ship transports must be relatively large to ensure an economical implementation. Railroad or ship transportation has to deal with a number of logistic and economic limitations and its application in the waste sector is hence rather seldom. To overcome part of these problems special wagons for swap body containers are available for railroad transports. Here, collection vehicles can transfer their swap body directly onto the wagon without further technical means.

Figure 4: Waste transfer station with a ramp for the unloading of the collection vehicle and an excavator for reloading the waste *(Picture source: Intecus GmbH)*

Whether or not it makes sense to have the waste material compressed during the reloading depends largely from the costs for the compression and the savings resulting from the higher loads that can be send on long distance transport at once.
The following additional installations integrated into a waste transfer station proved to be useful:

- Weighing bridge for the registration of the incoming waste amounts
- A plain, sealed area or bunker for the temporary storage of waste
- Reception point for small waste amounts delivered by individuals

Waste Transfer Stations

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Quantity aspects	As a matter of efficiency waste transfer stations should be planned with a basic work load which considers the technical and personnel expenses for its operation. Above this, waste transfer stations can be adjusted in size to the waste amounts that need to be handled.
Scale of application	From as low as 5,000 t/a up to 500,000 t/a and more Waste transfer stations can be more easily adjusted to the actual needs of an area
Inter-operability	Can be integrated at any point of the waste transportation chain and flexibly adjusted to the available infrastructure and technical systems in use for the collection/pickup and transportation of the waste.

OPERATIONAL BENCHMARKS

Aids needed

Usually some mobile equipment such as cranes, excavator or wheel loader are necessary for the reloading procedures. Optional a press can be installed.

Human resources needed

The following considerations on resource consumption and costs are made on the example of three different arrangements for a waste transfer station with an annual throughput of about 30,000 t and trucks for long-distance transportation. These arrangements are as follows:

1) Reloading of swap body container from the collection truck onto long-distance trucks without additional technical support
   - needed is a suitable surface only
   - the drivers of the different trucks exchange the containers by themselves
2) Reloading from a collection vehicle with a fixed superstructure into a long-distance vehicle without the compression of the waste
   - the reloading is done in that the collection truck discharges the collected waste material directly into the long-distance vehicle via a ramp
   - the waste transfer station is placed within a hall
   - a technical staff of 2 persons is needed to supervise the reloading process
3) Reloading from a collection vehicle with a fixed superstructure into a long-distance vehicle with closed swap body container including the compression of the waste
   - reloading from the collection vehicle into the press is done by means of a wheel loader or excavator
   - the waste is directly pressed into the swap body container by the press installation
   - a technical staff of 4 persons is needed to supervise the process

Investment/ Operating costs

The cost examples are given on the basis of the depreciation rate for investment and running costs (depreciation period of 20-25 years):

1) up to 10,000 Euro/a
2) 250,000 – 350,000 Euro/a plus the personnel costs (2 persons)
3) 300,000 – 450,000 Euro/a plus the personnel costs (4 persons)

Mass specific overall costs

0.1 – 15 EUR/Ton

REFERENCES

Fact sheet based and adapted from ‘Best Practice Municipal Waste Management’ edited by BMU