TRANSFER OF HIGH-EFFICIENCY WASTE FOR TRUCK, RAILROAD AND/OR FLUVIAL TRANSPORTATION

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TRANSFER STATIONS:

Link between the community Waste Collection System and the final disposal site, increasingly further away from metropolitan areas.

Transfer Stations are built to:

Reduce system costs achieving a better efficiency in the collection service:

- Secure an effective collection system
- Speed up waste collection
- Avoid further traffic inconveniences
- Reduce transportation costs
- There is an additional advantage in Sanitary Landfills operation since less vehicles arrive at the site.
Transfer Stations: Main Benefits

**Transportation Savings:**
Payload in transfer trailer: 18 to 30 ton; Collection truck: 4 to 10 ton.

**Savings in Manpower:**
Transfer trailer: Driver only; Collection truck: 2 to 3 people + Driver

**Savings in Gas and Tolls:**
Transfer trailer and collection truck consume almost the same; Savings due to less trips

**Reduction in the Costs due to Wear and/or Breaking of Equipment:**
Less overall wear, less worn tires and less damage to the transmission and suspension caused by operating in irregular and muddy surfaces of landfill areas.

**Versatility:**
The flexibility of transference systems provides freedom to change the final destination of waste causing a minimum impact on the collection operation.

**Reduction of front-end dumping in landfills:**
A sanitary landfill which receives only waste transported by transfer trailers requires dumping site with less than half the surface than a landfill receiving a similar amount of waste transported by collection trucks.

**Possibility of Integration with Classification and Assessment Plants for Recycling:**
The Transfer Stations can be integrated with Waste Classification and Assessment Plants, thus providing an excellent chance to separate and recover assessed materials and expanding the life span of final disposal sites.
TYPES OF TRANSFER STATIONS

Basic Transfer Station Technologies

A. OPEN TOP TRANSFER TRAILERS
   - DIRECT DUMP
   - PUSH LOAD
   - TIPPING FLOOR
   - TRANSFER TRAILER

B. SURGE PIT
   - TIPPING FLOOR
   - OPEN TOP TRAILER OR PRE-COMPACTOR

C. COMPACTOR SYSTEM
   - TIPPING FLOOR
   - HYDRAULIC RAM
   - TRANSFER TRAILER

D. PRECOMPACTOR SYSTEM
   - TIPPING FLOOR
   - PRECOMPACTED WASTE "LOG"
   - PRECOMPACTOR

E. BALER
   - TIPPING FLOOR
   - BALER
   - FORKLIFT
   - FLATBED TRAILER

F. INTERMODAL CONTAINER SYSTEM
   - TIPPING FLOOR
   - INTERMODAL CONTAINER
   - FLATBED TRAILER
   - RAILROAD FLATCAR
Transfer Stations in the Metropolitan Area of Buenos Aires

2. Transfer Plant: Three centers around Buenos Aires receive the waste from the trucks.

Average processing: 5,400 - 6,000 Tons per day

The transfer from one truck to another takes 30 minutes.

Compressor

80 per cent of the CEAMSE trips between the transfer plant and the sanitary landfill are done at night and take approximately 1 hour.

3. Final Disposal Center: That is the name of the place where the compacted waste is stored.

The transfer trucks carry the waste of 5 collection trucks.

The waste is uncompacted

Special machines spread and crush the waste

The waste is covered with earth

Where is it taken to?
TRANSFER STATIONS WITH STATIONARY COMPACTOR SYSTEM

- Most popular technique 30-35 years ago.
- Compaction chamber in the same container or trailer.
- Container or trailer sturdy enough to withstand compaction efforts.
- Heavy container or trailer, with tares from 9 to 15 ton, which lower payload capacity.
- They require constant maintenance.
- Almost no compaction at the front and maximum compaction at the back, requiring structure reinforcements that increase the tare.
- Uneven compaction implies an out-of-balance load, which concentrates in the rear axle. This, in turn, limits the load capacity to meet the load per axle allowed by traffic rules.
- This system can not be combined with weighing and controlled load systems of containers.
- This system is slow compared to other systems, thus requiring several compaction units.
TRANSFER STATIONS WITH TOP LOADING
TRANSFER STATIONS WITH TOP LOADING

- This system has become relatively popular in the US during the last 15-20 years.
- It does not include compaction equipment, thus causing the station investment to be lower.
- To achieve reasonable payloads, longer trailers with more volume are required. This requires “flattening” of waste to “fill each trip with more kilos”.
- A top loading trailer asks for a more sturdy design, both in the materials reception chamber and in the suspension, since it has to withstand the impact caused by tons of waste falling from a certain height.
- Even with a more sturdy design, they require constant maintenance.
- When waste falls, there’s a significant emission of dust, dirtiness and leaking of fluids in transfer stations and on the way to the disposal sites.
- Trailers also require quick and effective cover systems, which also have a significant cost.
- It is necessary to level and put salient materials in order before the covering process. This implies the need for manpower and a waste of time before the clearance of the trailer.
- You have to consider the uncovering operation before dumping in the landfill and the covering back for the return trip. This makes the operation last longer and requires a special building to be used on rainy days and adverse climate situations.
- It is very hard to combine this system with weighing and controlled load systems of containers.
- The optimization of weight to be transported and the uniformity of the load distribution can not be guaranteed. The trailer may be overloaded both at the front and at the back. If in doubt, less load than maximum load legally allowed is usually carried.
PRE-COMPACTION TRANSFER STATIONS with CONTROLLED PRE-LOAD

- This system is being increasingly used in the USA, due to its versatility and adaptability for truck, railroad and/or fluvial transport operations.
- Simple, hygienic operation, without dust emission or leaking of fluids. Once waste gets into the compaction chamber, it becomes out of reach and out of sight for the operating personnel.
- Basic principle: **Maximization of payload with more productivity and economy**
  Each kilogram you save in the system tare is a kilogram you gain in payload. The further away the final disposal site is, the more essential this principle becomes.
- The enclosed compaction system forms predetermined weight and maximum density compacted “packages” within the compaction chamber of the compactor, regardless of transportation equipment.
- At a transfer station equipped with this technology, different types of “packages” of different lengths and weights can be pre-programmed for different trailers or containers.
- It can be adapted to all sorts of compactable materials, whether they are MSW of any kind, demolition debris (C&D) and even electrical appliances. No compaction efforts are carried out against the walls or the ceiling of the trailer or containers. There are no impacts on the floor either.
- Pre-compacted “package” is transferred to trailer or container afterwards.
- From an environmental standpoint, enclosed trailers or containers, combined with compactors with controlled pre-load, are currently considered the best means of waste transportation.
- Adaptable system for enclosed trailers, with an ultralite design, usually of aluminum, with much smaller tares that allow for bigger payloads.
- Shorter trailers are easier to drive, both at the transfer station and on the road.
- **The total cost of** purchase, operation and maintenance is significantly lower than 1 usd/ton
PRE-COMPACTION TRANSFER STATIONS with CONTROLLED PRE-LOAD

• *Maximization of payload transported in each trip!!!*

• **System features:**
  - Pre-compact ed “packages” weighing 10 to 40 tons
  - Typical densities of 600 / 700 Kg/m³
  - Complete cycles from 10 minutes to 20 minutes in the larger equipment.
  - High level of production: up to 150 tons per hour with one compactor.

• **Advantages:**
  - **Higher Productivity:** The trailer or container does not need to be present during the compaction process, thus minimizing the traffic in the transfer station.
  - **Weight and Degree of Compaction Control Electronic System:** Compacted “packages” of *uniform and pre-determined weight* are obtained for *maximum payload*. Density and length can be adjusted to meet the needs of the fleet of trailers or containers.
  - **Soft ejection and exact positioning system:** It allows, softly and without impacts, for the *exact positioning* of compacted “package” along the trailer or container, thus obtaining an ideal distribution of the maximum loads per axle.
  - **Constant compaction strength during all the run:** It allows you to guarantee uniform density of compaction along the compacted “package”, from the first to the last compaction run.
  - **Simple and user-friendly touch screen control panel:** It allows you to visualize, control and register all the parameters of operation.
PRE-COMPACTION TRANSFER STATIONS with CONTROLLED PRE-LOAD

Typical plant
SSI PRE-LOAD COMPACTORS

SSI TRANSFER STATION PRE-LOAD COMPACTORS

**MODEL 5500**
SINGLE BALE SYSTEM / 120 tph

**MODEL 4500**
SINGLE BALE SYSTEM / 100 tph

**MODEL 2500**
DOUBLE BALE SYSTEM / 75 tph
TYPICAL DISTRIBUTION OF TRANSPORT WEIGHT

LOAD DISTRIBUTION CHART

<table>
<thead>
<tr>
<th>LOAD LOCATION</th>
<th>LOAD 'A'</th>
<th>LOAD 'B'</th>
<th>LOAD 'C'</th>
<th>TOTALS</th>
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<tbody>
<tr>
<td>TRACTOR TARE</td>
<td>4.500</td>
<td>3.500</td>
<td>-------</td>
<td>8.000</td>
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<tr>
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<td>5.625</td>
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<td>PAYLOAD</td>
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<td>15.375</td>
<td>29.500</td>
</tr>
<tr>
<td>TOTAL GROSS</td>
<td>6.000</td>
<td>18.000</td>
<td>21.000</td>
<td>45.000</td>
</tr>
</tbody>
</table>
TRANSPORTATION BY RAILROAD

Ideal Situation:
Transfer Station and Sanitary Landfill next to railroads to avoid intermediate road transportation that could imply restrictions on transported loads, also requiring intermediate container load and unloading sites.

Possibility of loading 40-feet containers with 35 tons of waste in a **double stack** layout, provided the journey, condition of railroads and bridges, maximum heights allowed, etc. allowed for it.

Examples:
- A 3,000 ton train carrying 50 container freight cars with 100 containers (Double load). If the train leaves at night, it arrives the following morning, is unloaded, returns during the day and can start another cycle the following night.
- A train may need to do an outward journey while another one is coming back.

Seattle, Washington State, with final disposal at Columbia Ridge Landfill, Oregon State
Distance: 300 miles (480 Km)
72 freight cars with 144 containers (Double load) with 27 net metric tons each = 3,900 ton per train.
Load capacity limited by road transportation to railroad.

*Containers specially designed for waste transportation* with wear plates and ventilation grilles to guarantee tightness and appropriate resistance to wear.
Guaranteed working life: 10 years
Typical weight of a special 40 feet x 8´6” x 8´0” intermodal container: 4,800 / 5,200 Kg, with a payload capacity of up to 32 metric tons.
The “Garbage Train” (Seattle-USA) – 3,900 ton / 480 Km
DUMPING IN LANDFILLS BY TIPPERS
SSI COMPACTOR SSI MODEL 2500
CAPACITY: 90 TONS/HOUR – (2-PARCEL SYSTEM)
TOP LOADING BY DRAGGING
SSI COMPACTOR SSI MODEL 2500
REPLACEMENT OF EXISTING COMPACTOR
SUPPLY WITH LOADING SHOVEL
SSI COMPACTADOR SSI MODEL 4500
SUPPLY THROUGH CONVEYOR BELT
CROSSHAULING EQUIPMENT, WHICH AVOIDS EXPENSIVE DIGGING OF TANKS
SSI COMPACTORS MODELS 4500 / 4500 SPH
UP TO 140 TONS/HOUR! WITH 35 TON PAYLOADS.
THE PRE-COMPACTION IS EASILY TRANSFERRED TO LIGHT ENCLOSED OR OPEN TRAILERS
COMPACTED WASTE INSIDE OPEN TRANSFER TRAILER
CLOSING OF TRANSFER TRAILER FULL OF COMPACTED WASTE
TRAILER/COMPACTOR INTERFACE
OPERATOR’S CONTROL PANEL WITH INTERACTIVE GRAPHIC DISPLAY
TRANSFER STATION WITH SITE FOR RAILROAD TRANSPORTATION
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TRANSFER STATION WITH SITE FOR RAILROAD TRANSPORTATION
CONTAINER CONCENTRATION SITE FOR RAILROAD TRANSPORTATION
CONTAINER CONCENTRATION SITE FOR RAILROAD TRANSPORTATION
35-TON PAYLOADS IN INTERMODAL TRANSPORTATION
IDEAL FOR RAILROAD TRANSPORTATION!
CONTAINER MANEUVER SITE IN MULTIMODE SANITARY LANDFILL
CONTAINER MANEUVER SITE IN MULTIMODE SANITARY LANDFILL
CONTAINER MANEUVER SITE IN MULTIMODE SANITARY LANDFILL
ROAD TRAILER MANEUVER SITE IN MULTIMODE SANITARY LANDFILL
DUMPING OF CONTAINERS BY TIPPERS IN SANITARY LANDFILL
DUMPING OF CONTAINERS BY TIPPERS IN SANITARY LANDFILL
WASTE CLASSIFICATION AND ASSESSMENT PLANT
PRE-COMPACTION OF CLASSIFICATION PLANT REJECTIONS FOR TRANSPORTATION
RAILROAD TRANSPORTATION OF CLASSIFICATION REJECTIONS TO POWER PLANT
RADIATION DETECTOR IN POWER PLANT USING WASTE
COMPACATION SYSTEM OF CONTROLLED PRE-LOAD FOR 20’ ISO CONTAINERS
20-TON LOADS TRANSFERRED TO CONTAINER SHIP
Gratitudes and Information Sources

- Mr. Carl Winans
- SSI Compaction Systems, Division of SSI Shredding Systems Inc.
- EPA - Environmental Protection Agency
- www.ceamse.gov.ar
- Columbia Corp.
- Olympic View Transfer Station, WA - USA
- U.P.R.R. Intermodal Rail Loading Facility, Seattle, WA - USA
- Roosevelt Regional Landfill and Waste by Rail System, WA - USA
- Columbia Ridge Landfill and Waste by Rail System, OR - USA
- Montgomery County Waste Transfer, Recycling Center, Waste-by-Rail and Resource Recovery Facility, MD - USA
- Own photos
- Andrés and Diana

Author: Engineer Luis E. Lewin

- Electromechanical Engineer (UBA). Member of AIDIS, ARS. More than 30 years experience in Equipment and Technologies for Volume Reduction and Recycling. Current Technical Director of ABYPER S.A. Manufacturer of ABECOM® machines and Regional Representative for SSI Shredding Systems Inc. and other international companies. Owner of patented inventions about waste compaction.