Recycling Technical Assistance
Final Report

City of Arnold

SWANA/Pennsylvania DEP

October 2002

RW·BECK

CITY OF ARNOLD
FINAL REPORT

Table of Contents

Section 1
INTRODUCTION

Overview

The City of Arnold provides monthly curbside recycling collection to its 2,200 households that includes the following recyclables:

- Newspapers;
- Magazines;
- Glass (green, amber, clear);
- Cans (aluminum, steel and bi-metal); and,
- Plastic bottles (PET and HDPE).

Recyclable materials are collected curbside using a 1992 Ford custom six-compartmented truck with a three-person crew. The City has a total of four recycling routes, which are collected every fourth Friday. Because the City's truck does not have the capacity to hold all of the recyclables collected in one pass, and because the nearest recycling facility requires that fiber and commingled containers be delivered separately, the City is currently required to make two round trips each route day.

Specifically, City crews first collect all of the fiber (newspaper and magazines) from that day's route and then transport the fiber to the local material recovery facility (MRF) (Pittsburgh Recycling Services MRF in Hazelwood). After tipping the first load, the truck returns, runs the route a second time to collect all of the commingled containers, and makes a second trip to the MRF. The total drive time for the 60 mile round trip is two hours, which means that four hours per day are spent driving.

Beyond the inefficiencies associated with making two daily round-trips, the design of the collection vehicle makes it difficult to lift heavy bales of fibers, especially when the truck has become half full or more. The sides of the truck are approximately 50 inches high. This not only creates a problem with efficiency, but could also be a potential safety hazard for the employees[1].

During calendar year 2001, the City collected 77.4 tons of commingled containers and 118.7 tons of fibers. Given that collection is provided one day per week, it is calculated that the City of Arnold collected a weekly average of 1.49 tons of commingled containers and 2.28 tons of fiber.

[1] Review and Evaluation of City of Arnold Public Works Program. Pennsylvania Department of Economic & Community Development; Governor's Center for Local Government Services. Prepared by Chester Engineers.

R. W. Beck worked with the City to evaluate the current recycling system collection costs and productivity levels, and identified specialized recycling collection trucks from several manufacturers that could improve the City's collection system.

Project Approach

The following steps were undertaken to assist the City:

1. **Kick-off meeting**: A one-day meeting was scheduled to outline project parameters and to provide an opportunity to observe route conditions that impact recycling vehicle performance and productivity;
2. **Recycling Truck Manufacturers**: R.W. Beck then researched recycling vehicles that are designed to collect fibers and commingled containers in two separate compartments on the truck, and that have sufficient capacity to hold a full week's worth of recyclables. Vehicle specifications were obtained for each vehicle from the manufacturer;
3. **Survey of Current Users**: To validate the capabilities of each vehicle under "real world" conditions, we then performed a survey of communities that currently use each of the vehicles identified in our research.
4. **Cost Analysis**: Finally, R.W. Beck compared the annualized capital and operating costs associated with purchasing a new recycling vehicle body with potential operating savings the City may achieve by reducing daily collection time by eliminating the need for multiple daily round trips.

The remainder of this report describes the findings of steps 2 through 4.

Section 2
RECYCLING TRUCK MANUFACTURERS

Split-body refuse collection vehicles are produced by a number of manufacturers. Typically the body manufacturer welds the body onto an existing chassis, which is equipped from the chassis supplier with the brand of engine specified by the purchaser. The chassis manufacturer also supplies the power takeoff, which runs off the engine and provides power to the hydraulic system. Several body types call for a drop frame chassis, which requires the body manufacturer to alter the chassis. The body manufacturer then takes over the warranty of that chassis. Body manufacturers weld the truck body onto the chassis and add the hydraulics system for the packer and automated lift arms, as well as the hydraulic controls.

Vehicles are generally purchased through a local vehicle distributor, who have field offices throughout different regions of the United States and sell through those field offices. Vehicles can also be purchased directly from the vehicle manufacturer.

We identified four recycling truck body manufacturers that offer split body trucks that could replace the City's current truck body and facilitate a single pass on each route to collect both fibers and containers. The manufacturers are listed alphabetically below[2], and described in the following sub-sections.

- Haul-All Equipment Systems;
- Heil Environmental Industries;
- LaBrie Equipment; and
- Lodal.

Haul-All Equipment Systems

Haul-All Equipment specializes in the design and manufacture of waste management systems, including storage containers, collection vehicles and transfer stations. Haul-All has designed collection vehicles for over 30 years. The Haul-All distributor located near the City of Arnold is:

V-Quip, USA
3407 Chestnut Street
Camp Hill, PA 17011
Contact: Rick Schlauder
(866) 878-4763

[2] Disclaimer: R. W. Beck does not endorse any individual vehicle manufacturer, nor do we work for any of the manufacturers listed here. The information presented is for reference only, and specific purchase decisions are the responsibility of the City via it's procurement process.

Haul-All manufactures a two-stream recycling vehicle called the RP235. This vehicle can be mounted on a conventional type truck chassis and is capable of one-person crew operation. The vehicle can be used to collect and load all types of recyclable material including cardboard, newspaper, and mixed paper as well as glass, plastic and metal containers. Additional specifications are provided below.

The Haul-All RP235

Performance and General Features

- **Load cycle**: 15 seconds at 1,600 engine RPM;
- **Rear door feature**: bubble design and powered hydraulically for dumping and closing;
- **Rear door feature**: incorporates positive lock;
- **Hydraulic hoist**: 12 ton capacity, twin double acting cylinders with 40-degree dump angle;
- **Body safety bar**: installed to prevent accidental dropping of the body while performing service;
- **Loading**: each body compartment has an independently operated hydraulically powered loading bucket;
- **Loading bucket**: bucket compresses materials against the body sidewall, and is fully lined with 3/4" plywood;
- **Loading bucket**: weight capacity of 600 lbs.;
- **Loading bucket compaction**: loading bucket is capable of providing compaction inside the body compartment at rates of up to 2:1;
- **Loading bucket safety**: safety chain will secure the bucket in the up position for travel;
- **Loading bucket size**: each loading bucket is one cubic yard and an optional one cubic yard fixed bucket extension is available.

Dimensions

- **Length**: 263 inches;
- **Width**: 102 inches;
- **Height**: 85 inches;
- **Mounted truck height**: 122 inches;
- **Maximum body height with tailgate raised**: 157 inches; and
- **Height with body raised**: 246 inches.

Body

- **Net body weight**: 9,000 lbs.;
- **Body capacity**: 35 cubic yards;
- **Loading**: left side of body;
- **Unloading**: rear-tailgate;
- **Front compartment capacity**: 16 cubic yards;
- **Rear compartment capacity**: 19 cubic yards;
- **Compartment features**: Swinging divider bulkhead can be hydraulically locked and unlocked from controls.

Construction

- **Top and side of body**: 14-gauge steel;
- **Floor**: minimum 10-gauge steel;
- **Frame**: 2" x 3" and 2" x 6" HSS tubing; and
- **Rear tailgate**: 12-gauge formed steel.

Hydraulics

- **Hydraulic reservoir**: 10 US gallons and includes breather/filter, internal magnet and level gauge;
- **Pump**: PTO driven gear pump minimum 10 US GPM @ 800 RPM activated by in-cab switch;
- **Pump**: will not operate unless transmission is in neutral;
- **Hydraulic valves**: spool-type directional control with 2,000 PSI rating and 20 US GPM flow rating; and
- **Hydraulic hoses**: rated for 3,500 P.S.I. (operating).

Hydraulic Container Dumping Cylinder

- **Cylinder**: truck contains counterbalanced hydraulic cylinder with manual control valve;
- **Cylinder**: capable of lifting 4,000 lbs.;
- **Cylinder**: mounted on a retracting, folding arm; and
- **Cylinder**: locks positively into container mounting lugs when pressurized by collection vehicle hydraulic system during the dumping operation.

Warranty

- 12 months parts and labor.

Heil Environmental Industries, Limited

Heil, owned by holding company Dover Industries, has been in business since 1901. Heil began as an electric welding company and later began manufacturing agricultural equipment. Following that success, they expanded into manufacturing refuse collection equipment. Heil has recently opened a customer education center next door to their design and manufacturing facility in Fort Payne, Alabama. In addition, they have two mobile classrooms, one for the east region and one for the west that bring training to the customer. Heil trucks are manufactured in Fort Payne, Alabama and in Phoenix, Arizona. The Heil distributor located closest to the City of Arnold is:

The Quality Truck Body
4440 Simon Road
Boardman, OH 44512-1393
(800) 628-0098

Recycle 2000

The Heil Recycle 2000 is a split-body, two-stream automated recycling system. The vehicle includes two large bins that can be manually loaded during curbside collection of bagged or bundled recyclables, while the bin lift operation automatically dumps each bin into the appropriate chamber. Typically, newsprint is loaded into the bottom compartment of the vehicle, and co-mingled recyclables are deposited into the top chamber.

The Heil Recycle 2000

The design of the vehicle allows the two body chambers to be emptied independently, for ease of unloading at the recycling facility. The bottom holds approximately 55% of the total volume, and the top holds approximately 45%. The body is available in 28- and 33- cubic yards. Additional specifications are as follows:

Performance and General Features

- **Bin lift capacity**: 1,000 lbs.;
- **Bin volume**: four-tenths of a cubic yard each;
- **Bucket lift cycle time**: 12 seconds;
- **Packing time**: 18 seconds;
- **Working RPM**: 750 (operate-in-gear-at-idle);
- **Homes per day**: up to 800; and
- **Compaction**: 750 lbs. per cubic yard.

Dimensions

- **Length**: 304 inches;

- **Length**: 415 inches long with tailgate/body raised;
- **Width**: 96 inches;
- **Height**: 104 inches above the frame with the body down;
- **Height**: 218 inches above the frame with the body raised;
- **Height**: 151 inches above the frame with the bin raised;

Body

- **Net body weight**: 15,800 lbs.;
- **Total body capacity**: 33 cubic yards;
- **Top compartment capacity**: 15 cubic yards;
- **Bottom compartment capacity**: 18 cubic yards;
- **Top hopper capacity**: 2 cubic yards;
- **Bottom hopper capacity**: 5 cubic yards; and
- **Dump angle**: 40 degrees.

Construction

- **Top, sides, floor, floor support members, tailgate rear panel, tailgate sides and hopper sides**: 11-gauge steel;
- **Body longitudinal**: 7-gauge steel;
- **Hopper floor**: 3/16 inches; and
- **Hopper side liners**: 3/16 inches.

Hydraulics

- **Hydraulics**: 2,500 PSI maximum operating pressure;
- **Hydraulics**: 26 gallon oil reserve tank;
- **Hydraulics**: Return line 10 micron, 100 mesh suction strainer; and
- **Working RPM**: 1,200.

LaBrie Equipment

LaBrie began in 1933 as a heavy-truck garage. Claude Boivin, current president of LaBrie, is credited with changing the direction of the company in 1971. He transformed the small enterprise with 12 employees into a center specializing in the installation of gravel hoppers and molded hoppers onto truck bodies. LaBrie began manufacturing refuse truck bodies in the 1970s. They are the only refuse body manufacturer that is ISO 9001 certified.

In 1987 the company became the first North American company to offer a hydraulically loading recycling truck that requires only a single operator to drive and perform the collection. That vehicle is called the Top Select. In 1993 LaBrie developed a compaction unit called "The Maximizer" for the Top Select, which greatly increased its load capacity. In 1994 LaBrie began manufacturing the Expert 2000, a side-loading collection vehicle. LaBrie has two plants, one in St-Nicolas, Quebec, and a second facility, also in Quebec, where drop-frame chassis conversions are done. Together, these plants produce over 600 vehicles a year.

LaBrie sells refuse collection vehicles in Canada, Europe, and throughout the United States. They have a network of over 40 distributors and representatives. LaBrie offers tailor-made leasing programs, a wide selection of chassis in stock, as well as cab conversions and drop frame modifications, if needed. The distributor that is located closest to the City of Arnold is:

A&H Equipment
1124 McLaughlin Run Road
Bridgeville, PA 15017
Contact: Tripp Amick
(412) 257-1160

Expert 2000

LaBrie's Expert 2000 is a drop-frame side-loading vehicle that comes equipped with a semi-automated cart tipper, and has a low hopper to facilitate manual collection. Recyclables can be collected manually or semi-automatically from either side of the vehicle. The Expert Cool Hand is an Expert 2000 with an automated arm, for fully-automated refuse collection. The Expert 2000 is available with a 60/40 vertical split body and hopper to facilitate simultaneous collection of two materials using a split cart. The Expert 2000 is available in the following capacities:

The LaBrie Expert 2000

- Single-Axle Chassis: 22 and 24 cubic yards; and
- Tandem-Axle Capacity: 33, 35, 37 and 38 cubic yards.

Standard packer controls are located on the right-hand side of body. As an option, controls can also be placed on the left-hand side and on the console located inside the cab.

Compaction cycles can be programmed (two to six multi-cycles available). Additional specifications are as follows:

Dimensions

- **Length**: 220 inches;

- **Width**: 96 inches; and
- **Height above frame**: 80 inches.

Body

- **Capacity**: 17 cubic yards (excluding hopper).

Construction

- **Floor**: 3/16 inches;
- **Floor slope**: ¼ inches;
- **Sides, roof and tailgate**: 12-gauge steel; and
- **Long sills**: HSS tubing (6"x 2"x 3/8").

Hydraulics

- **Working pressure**: 2,000 psi;
- **Hydraulics**: 66-gallon hydraulic oil reserve;
- **Hydraulics**: 100 mesh stainless steel tank mounted strainer; and
- **Hydraulics**: 7 microns filter 150 GPM, in-tank return filter.

Hopper

- **Sweeping volume**: 1.38 cubic yards;
- **Capacity**: 4.5 cubic yards; and
- **Loading height**: 5.5 inches above frame height.

Compactor

- **Packer sweep volume**: 1.38 cubic yards;
- **Inside packer penetration**: 12 inches;
- **Hopper depth**: 18 inches; and
- **Hopper opening**: 60 inches wide and 66 inches high.

Warranty

- 12 months on defective parts and workmanship; and
- 3 years on hydraulic cylinders.

Lodal

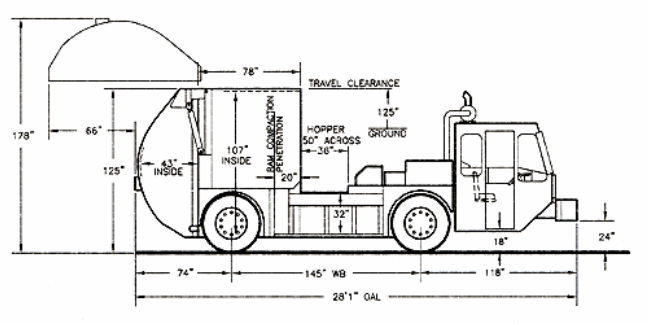
Lodal has been in business since 1953. They manufacture and sell primarily refuse collection vehicles, although they offer a dual compartment vehicle for recyclables as well. The closest Lodal distributor to the City of Arnold is:

Best Equipment
2804 N. Catherwood Avenue
Indianapolis, Indiana 46219
Contact: Mike Dahlman
(317) 545-6262

EVO SERIES

Lodal's EVO series vehicles differ from the other vehicles in that it is designed as a completely integrated unit (body and chassis). Additionally the vehicles are front-wheel drive, so there is no drive train under the vehicle. This means that the height of the differential can be only one foot off the ground, thus the hopper is twice as deep as many others, at 32 inches. The EVO series vehicles can be built with one or two rear axles. The single-axle vehicle is available in 17- or 20-cubic yard capacities. The dual-axle is available in 17-, 20-, 25-, and 28-cubic yards. The dual-compartment model is the EVO Split T-28. Recyclables can be collected from both sides of the EVO vehicle. The Lodal EVO series can be operated manually, semi-automated or fully automated. Additional specifications for the Lodal EVO 17XL series include:

Dimensions



Dimensions for the Lodal Split T-28

Body

- **Vehicle weight rating**: 39,000 lbs. GVW;
- **Front axle weight (empty)**: 16,400 lbs.;
- **Rear axle weight (empty)** : 6,300 lbs.;
- **Total weight (empty)**: 22,700 lbs.;
- **Total body capacity**: 17 cubic yards;
- **Hopper Capacity**: 14 cubic yards each;
- **Tailgate**: top-hinged, self-locking;

Hydraulic System

- **Pump gear type**: 30 GPM @ 1,400 RPM;
- **Pump drive**: direct off engine crankshaft;
- **Hydraulic reserve**: 48 gallon with sight gauge;
- **Hydraulic control valve**: two-spool (air operated compact) push button hydraulics;
- **Controls**: Compaction control and emergency stop button on each side of hopper & inside cab; and
- **Controls**: Manual hydraulic control levers each side of hopper.

Side Loading Hopper

- **Capacity**: 1.25 cubic yard (250 gallon);
- **Dimensions**: 32" deep x 50" wide x 36" long?);
- **Loading height**: 34" from running board, 48" from ground;
- **Hopper feature**: 10" fold-up bang board on left side hopper;

Compactor Ram & Load Ejector

- **Compaction force**: 130,000 lbs. of 3,000 psi.
- **Cylinders**: two-stage telescopic 5.25" D. 1st stage, 4.25" D. 2nd stage; and
- **Compactor ram** - 50" wide X 32" deep with 72" long rigid top cover.

Section 3
SURVEY OF CURRENT USERS

R.W. Beck solicited comments from users of these collection vehicles. Note that the comments presented here are direct quotes from survey respondents, and do not reflect the opinions of R. W. Beck. R. W. Beck does not endorse any individual vehicle manufacturer, nor do we or have we worked on behalf of any of the manufacturers listed here. The information presented is for reference only, and specific purchase decisions are the responsibility of the City via its procurement process. Note also that vehicle specifications, procurement practices, use, and maintenance practices can affect vehicle body and performance.

Most of the comments below are direct quotes from survey respondents. R. W. Beck observations are included parenthetically.

General Comments

- "We find it beneficial to stick with one manufacturer. That way our maintenance is more standardized. It's easier to keep parts on hand, and our service technicians are very familiar with the vehicles." – *Visalia, California.* (There are some drawbacks to this, as well, such as not being exposed to other vendors' innovations.)
- "If you stick to the manufacturers' recommendations for preventive maintenance, your odds of keeping the truck on the road increase by 200%." – *Rochester, New York.*
- "Buy quality up front. It is cheaper in the long run than repairing junk." – *Rochester, New York.*
- "Left-hand drive is a nightmare." – *Goffstown, New Hampshire.*
- "I would not recommend buying a first generation vehicle. Let the manufacturer work out the kinks first." – *Roanoke County, Virginia.*

Endorsements

- "The **Heil Recycle 2000** is an excellent vehicle. We really like to sweep-type blade, as it makes the vehicle operate like rear-load type. We mount the body on an International 4900 Series and use International 266 Engines with 250 HP, as well as Alisson automatic MD-3560 engines. Both of these systems work extremely well with the Heil Recycle 2000." – *Penn Waste.*

- "All of our recycling trucks are the **Heil Recycle 2000**. We are very happy with them and would never use anything else. We do recommend an engine with at least 300 to 350 Horsepower if you have steep hills. We mount our Heil body on a Condor/Sterling Chassis and use Lentry Mac E-7 Engines." – *BFI Northeastern Ohio*
- "The **Heil Recycle 2000s** are excellent. It is the best body we have ever had. We have not had any problems, so we have not tested the warranty. Our body is on a Peterbilt, and it works very well." – *The City of Warwick, Rhode Island.*
- "We have two, **Lodal EVO** Series, and have been extremely happy. Initially, we had some problems with the electronics and Lodal was extremely helpful and responsive. The drivers really like the low entry and that they are easy to load. Both the body and chassis are manufactured as a unit by Lodal. Because of this, we feel that they work better as a system. We use Caterpillar Engines and Allison transmissions" -- *Recycle Ann Arbor*.
- "We like that the **Lodal EVO** are a one person vehicle. The warranty has been good, they have a good resale value and we have not experienced performance problems." – *Alloway, Wisconsin*.
- "Since we started using the **Lodal** vehicles, we have been able to reduce our staff from 101 to 15 employees. The only trouble we had was with the radiator. When we called Lodal, a brand new radiator was delivered within two days. Additionally, they also listened to our concerns and changed the design. The tires are more expensive, but they last longer." – *Town of Richmond, Indiana.*
- "We have been using the **Haul-All RD235** since July of 2000. We have very few mechanical problems. The body is very reliable. We have had some problems with the hydraulics, but they are same problems we experience on all vehicles with hydraulics. It is very easy to get replacement parts. The body is very simple to use and load into. We did take advantage of the training program and it was done well. Delivery time was good, in fact the body was ready before we were." – *Monroe County, Pennsylvania*

Purchasing Considerations

Most municipalities report that they purchase their refuse collection vehicles through a local distributor for the truck body manufacturer. Some purchase their vehicles through a local chassis manufacturer. Nearly all respondents note that it is crucial to purchase vehicles from a vendor in close proximity, in order to ensure good service and warranty support.

The quotes below provide insight about purchasing strategies.

- "We are very happy with the LaBrie CoolHand, however we have had to do a lot of our own warranty work because the dealer is far away." – *Bartlett, Tennessee*
- "We have been very happy with our local Heil distributor's warranty and customer support." – *Visalia, California*. (Sentiment shared by *Little Rock, Arkansas, and Goffstown, New Hampshire.)*

- "We stipulated in our specifications that if the vendor was within 20 miles we would transport the vehicle to them for repairs, if they were outside of a 20-mile radius they would be responsible for transporting the vehicle. They will not provide us with a loaner vehicle; we just have to have enough backup vehicles to cover."– *Rochester, New York.*
- "Over the years we have had to fight harder and harder for warranty support." – *Rochester, New York*.

Section 4
COST SAVINGS ANALYSIS AND RECOMMENDATIONS

As a final step to our analysis, R. W. Beck compared the current cost of unproductive drive time associated with making two round trips per day against the cost of purchasing a new truck body that has the capacity and compartment configuration needed to collect all recyclables in one pass and require only a single daily round trip.

Savings Achieved by Reducing Collection Time: With a new truck that is capable of collecting all recyclables in one pass, the City would reduce current collection costs by half. The total annual cost savings of eliminating the need to run the route for a second time and making a second daily round trip to the MRF is estimated to be $15,489. This was derived based on the following assumptions:

- Annual fuel cost of $702 based on 52 round trips per year, 60 miles per round trip, 6 miles per gallon fuel efficiency and $1.35 per gallon fuel cost;
- Annual labor costs of $14,787 based on three crew persons earning a combined hourly rate of $71.09 (including benefits), four hours per week over 52 weeks per year.

Annualized Cost of New Recycling Vehicle Body: A split-body recycling collection vehicle body, with a capacity of 20 to 30 cubic yards, costs approximately $60,000 to purchase new. If the City of Arnold were to use their existing chassis and engine, the annual cost of financing this new recycling vehicle, over seven years at an interest rate of 8 percent, would be $11,222.[3]

Net Savings to City: The City stands to achieve cost savings if it can successfully eliminate the second daily pass for each recycling route. This cost savings could be achieved assuming that the collection crew could be re-assigned to perform other productive work for the four additional hours that are no longer required to complete the route each day. This cost savings will be offset by the annualized capital costs of the new recycling truck body. The net annual cost savings is estimated to be $4,267. Table 1 summarizes the net impacts of purchasing the new truck.

[3] The current recycling vehicle in the City of Arnold only has approximately 28,000 miles. Based on feedback from the City, it is not recommended that a new engine/chassis be purchased at this time.

Table 1

Collection Productivity Cost Savings vs. Annualized Recycling Truck Capital Costs

Expense	Current System Costs	Costs Assuming New Truck Body Purchased	Net Savings/ (Cost) to City
Costs associated with second pass on each daily route			
Labor	$14,787	$ 0	$14,787
Fuel	$ 702	$ 0	$ 702
Annualized Capital Cost of Vehicle Body	NA	$11,222	($11,222)
Annual Total	**$15,489**	**$11,222**	**$ 4,267**

As shown in the Table, the City will experience a net savings of $4,267 by purchasing a split body recycling vehicle.