# NETL Life Cycle Inventory Data
# Process Documentation File

**Process Name:** Fuels Tanker Trailer, 7,500 gallon, Construction

**Reference Flow:** 1 kg of Fuel Transported by Tanker Truck

**Brief Description:** Based on manufacturer specifications for a Volvo Cab and a Polar Alm. Trailer, 7,500 gallons. The cab and trailer are used in transporting petroleum based fuels. Materials include steel plate, aluminum, nylon, polyurethane, lead and styrene.

## Section I: Meta Data

**Geographical Coverage:** US **Region:** N/A

**Year Data Best Represents:** 2009

**Process Type:** Manufacturing Process (MP)

**Process Scope:** Gate-to-Gate Process (GG)

**Allocation Applied:** No

**Completeness:** Individual Relevant Flows Recorded

**Flows Aggregated in Data Set:**

☒ Process ☐ Energy Use ☐ Energy P&D ☐ Material P&D

**Relevant Output Flows Included in Data Set:**

| | | | |
|---|---|---|---|
| Releases to Air: | ☐ Greenhouse Gases | ☐ Criteria Air Pollutants | ☐ Other |
| Releases to Water: | ☐ Inorganic Emissions | ☐ Organic Emissions | ☐ Other |
| Water Usage: | ☐ Water Consumption | ☐ Water Demand (throughput) | |
| Releases to Soil: | ☐ Inorganic Releases | ☐ Organic Releases | ☐ Other |

**Adjustable Process Parameters:**

| | |
|---|---|
| Tractor Lifetime | *The lifetime of the tractor (cab) of the truck, in years* |
| Tanker Trailer Lifetime | *The lifetime of the trailer of the truck, in years* |
| Tire Lifetime | *The lifetime of the tires on the tractor, in years* |

**Tracked Input Flows:**

| | |
|---|---|
| Aluminum sheet [Metals] | *Aluminum used to construct tractor and trailer, in kg* |
| Lead (99.995%) [Metals] | *Lead used to construct tractor, in kg* |
| Nylon 6.6 granulate (PA 6.6) [Plastics] | *Nylon used to construct tractor, in kg* |
| Polyurethane flexible foam (PU) [Plastics] | *PU plastic used to construct tractor, in kg* |
| Styrene-butadiene-rubber (SBR) [Plastics] | *SBR plastic used to construction tractor, in kg* |
| Steel Plate, BF (85% Recovery Rate) [Metals] | *Steel plate from blast furnace used to construct tractor, assumes 85% recycled/recovery rate, in kg* |

**Tracked Output Flows:**

| | |
|---|---|
| Fuels Tanker Trailer, 7500 gallon | *Construction of a single Volvo tractor and a Polar Alm. Trailer* |

## Section II: Process Description

### Associated Documentation

This unit process is composed of this document and the data sheet (DS) *DS_Stage4_C_Fuels_Tanker_Trailer_7500gal_2010.02.xls*, which provides additional details regarding calculations, data quality, and references as relevant.

### Goal and Scope

The scope of this process encompasses the materials and weights of those materials necessary to construct a single Volvo FH or FM tractor (cab) and a Polar Alm. Trailer for transport of liquid fuels. The process is based on the reference flow of 1 piece of tanker trailer, 7,500 gallons, as described below, and as shown in **Figure 1.** The tanker trailer is assumed to be constructed out of aluminum, lead, nylon granulate, polyurethane foam, steel plate and styrene-butadiene-rubber. Other materials are assumed to be negligible.

This process is used during Life Cycle (LC) Stage #4 to assist in the transportation of liquid fuels from the bulk storage facility to the refueling station. The flow of fuel in LC Stage #4 is as follows: fuel enters a pipeline from the plant (LC Stage #3), the pipeline empties into a bulk storage facility, the bulk storage facility fills tanker trailers for distribution, and the distribution ends at the refueling station. The refueling station unit process is completed when the fuel is dispensed into the tank of a vehicle for LC Stage #5.

## Boundary and Description

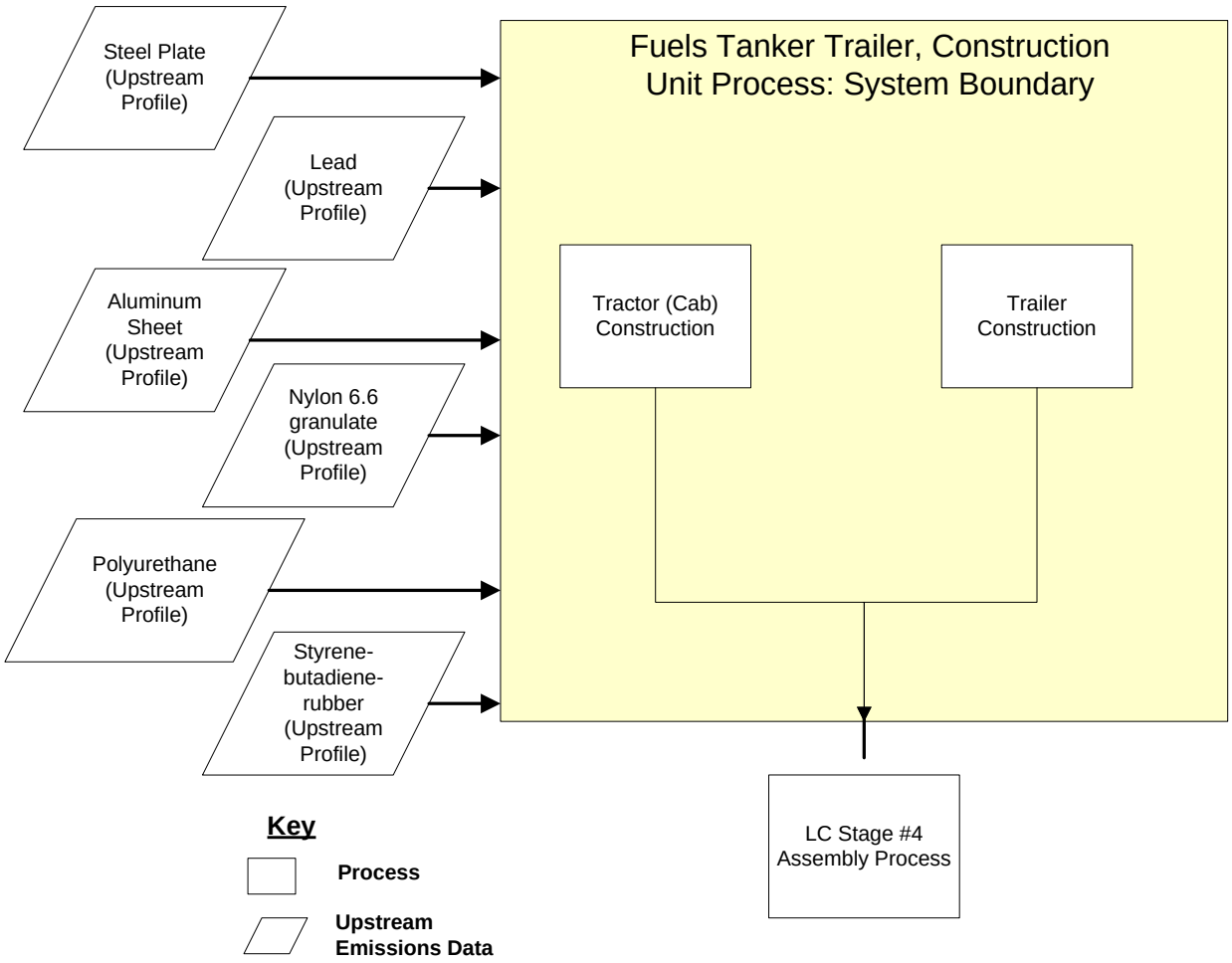
Construction of the cab and trailer is based on manufacturer specifications for a Volvo FH or FM Tractor (cab) and a Polar Alm. 7,500 gallon trailer. The tanker trailer is used to transport fuels from the bulk storage facility to the refueling station. Several adjustable parameters have been included in this unit process, as shown above, which can be adjusted based on available information or study assumptions, as additional/relevant data are available.

**Figure 1** provides an overview of the boundary of this unit process. Emissions related to the physical assembly of the tanker trailer (e.g., that are emitted while putting together the components of either the cab or the trailer, including transport of those components) are not considered in this study. Upstream emissions from the production of raw materials used for the construction of the tanker trailer (e.g., steel plate, etc) are calculated outside the boundary of this unit process, based on proprietary profiles available within the GaBi model.

The total weight and breakdown of the cab was readily available. Materials below the cutoff criteria were not included in this unit process. The total weight of the trailer was scaled from readily available information, but no reliable data for the material breakdown was found. Therefore the trailer was assumed to be composed entirely of aluminum. The materials and their associated weights in this unit process are provided in **Table 1**.

**Table 2** shows relevant properties used to calculate the unit process values for the tanker trailer. **Table 3** provides a summary of modeled input and output flows. Additional detail regarding input and output flows, including calculation methods, is contained in the associated DS sheet.

## Figure 1: Unit Process Scope and Boundary




## Table 1: Material Components of the Fuel Tanker Trailer

| Materials | Weight | Unit | Reference |
|---|---|---|---|
| **Volvo** | | | |
| Aluminum | 201 | kg | Volvo 2001 |
| Lead | 95 | kg | Volvo 2001 |
| Nylon | 170 | kg | Volvo 2001 |
| Polyurethane | 170 | kg | Volvo 2001 |
| Steel Plate | 5,442 | kg | Volvo 2001 |
| Styrene-butadiene-rubber | 459 | kg | Volvo 2001 |
| **Polar Alm.** | | | |
| Aluminum | 4,309 | kg | Hoffman 2009 |

**Table 2: Properties of the Fuel Tanker Trailer**

| Property | Value | Unit |
|---|---|---|
| Cab Lifetime | 5 | year |
| Trailer Lifetime | 10 | year |
| Quantity of Fuel Transported | 8,071,847 | kg/year |
| Tire Lifetime | 1 | year |

**Table 3: Unit Process Input and Output Flows**

| Flow Name* | Value | Units (Per Reference Flow) |
|---|---|---|
| **Inputs** | | |
| **Aluminum sheet [Metals]** | **5.8436E-05** | **kg** |
| **Lead (99.995%) [Metals]** | **2.3567E-06** | **kg** |
| **Nylon 6.6 granulate (PA 6.6) [Plastics]** | **4.2049E-06** | **kg** |
| **Polyurethane flexible foam (PU) [Plastics]** | **4.2049E-06** | **kg** |
| **Steel plate, BF (85% Recovery Rate) [Metals]** | **1.350E-04** | **kg** |
| **Styrene-butadiene-rubber (SBR) [Plastics]** | **5.6933E-05** | **kg** |
| **Outputs** | | |
| Fuels Tanker Trailer, 7500 gallon | 4.13E-09 | pcs |

* **Bold face** clarifies that the value shown *does not* include upstream environmental flows. Upstream environmental flows were added during the modeling process using GaBi modeling software, as shown in Figure 1.

## Embedded Unit Processes

None.

## References

Volvo 2001 — Volvo Truck Corporation. 2001. Environmental Product Declaration: Volvo FH12 and Volvo FM12, Euro 3. Volvo Truck Corporation. http://www.volvotrucks.com/SiteCollectionDocuments/VTC/Corporate/About%20us/Environment-2012/euro3_03.pdf (Accessed April 9 2012)

Hoffman 2009 — Hoffman Transportation. 2009. 2008 Polar Alum. Double Conical DOT 407 Single Compartment. Penton Media Inc. http://www.trucker.com/TrailerDetail.aspx?TrailerID=187032&CompanyID=30429 (Accessed December 18, 2009)

## Section III: Document Control Information

**Date Created:** April 11, 2012

**Point of Contact:** Timothy Skone (NETL), Timothy.Skone@NETL.DOE.GOV

**Revision History:**

[11APR2012] Updated reference flow and fixed broken parameter name.

**How to Cite This Document:** This document should be cited as:

NETL (2010). *NETL Life Cycle Inventory Data – Unit Process: Fuels Tanker Trailer, 7500 gallons, Construction.* U.S. Department of Energy, National Energy Technology Laboratory. Last Updated: April 2012 (version 02). www.netl.doe.gov/energy-analyses (http://www.netl.doe.gov/energy-analyses)

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