NETL Life Cycle Inventory Data
Process Documentation File

Process Name: Mining Truck for Surface Mine, 623,690 kg, Construction

Reference Flow: 1 piece (pcs) of Mining Truck Construction

Brief Description: Based on manufacturer specifications for a Caterpillar model 797B, 623,690 kg, mining truck, to carry coal at a Powder River Basin surface mine for subbituminous coal. Quantifies the amount of steel and rubber needed for construction.

Section I: Meta Data

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

Year Data Best Represents: 2003

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:

Tracked Input Flows:

Steel Plate, BF (85% Recovery Rate) [Metals]	*Steel plate from blast furnace used to construct the mining truck, assumes 85 percent recycled/recovery rate*
Styrene-butadiene-rubber (SBR) [Plastics]	*Rubber used for the tires of the mining truck*

Tracked Output Flows:

Section II: Process Description

Associated Documentation

This unit process is composed of this document and the data sheet (DS) *DS_Stage1_C_Mining_Truck_623690kg_2010.01.xls*, which provides additional details regarding calculations, data quality, and references as relevant.

Goal and Scope

The scope of this unit process encompasses the materials and weights of materials necessary to construct a single 623,690 kg mining truck, to be used for the transportation of coal at a surface mine located in the Powder River Basin region of the United States, during raw material acquisition. The process is based on the reference flow of 1 piece of mining truck, 623,690 kg empty truck weight, as described below, and as shown in **Figure 1.** The mining truck is assumed to be constructed of steel plate, and styrene-butadiene-rubber for the tires; therefore steel plate is assumed to be the only material required for the remainder of the truck construction. Other materials are assumed to be negligible.

This process is used during LC (Life Cycle) Stage #1 to assist in the preparation of subbituminous coal extraction process by transporting the coal within the boundaries of the surface mine. It is combined with other surface mine equipment construction unit processes in an individual assembly surface unit process for Powder River Basin sub-bituminous coal, DF_Stage1_C_Assembly_PRB_Coal_Surface_Mine_2010.01.xls. This assembly unit process quantifies the fraction of each piece of equipment needed under LC Stage #1 to produce 1 kg of coal ready for transport (LC Stage #2) to the energy conversion facility.

Boundary and Description

Construction of the mining truck is based on manufacturer specifications for a Caterpillar model 797B, 623,690 kg mining truck. The mining truck is used to transport extracted coal to the crushing facility in preparation for transport. All use of the mining truck occurs within the confines of the mine.

Figure 1 provides an overview of the boundary of this unit process. Emissions related to the physical assembly of the mining truck (e.g., that are emitted while putting together the components of a mining truck, 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 mining truck (e.g., steel plate) are calculated outside the boundary of this unit process, based on proprietary profiles available within the GaBi model. As shown in Figure 1 and discussed above, the mining truck

constructed in this unit process is incorporated into the Powder River Basin surface mine assembly processes for LC Stage #1 for sub-bituminous coal.

The total weight of a mining truck was readily available but reliable data for the material breakdown of mining truck subcomponents aside from the tires were not. Therefore, the mining truck was assumed to be composed solely of carbon steel (Steel plate, BF (85% Recovery Rate) [Metals]) and rubber (Styrene-butadiene-rubber (SBR) [Plastics]).

Table 1 shows relevant properties and assumptions used to calculate the amount of steel plate contained in a single mining truck. Total weight for one mining truck is estimated to be approximately 623,690 kg (1,375,000 lbs) (Caterpillar 2003). Based on the assumption that the truck is constructed entirely out of carbon steel with the exception of the tires which are made out of styrene-butadiene-rubber, 31,815 kg are assigned to the tires with the remainder attributed to carbon steel. **Table 2** 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

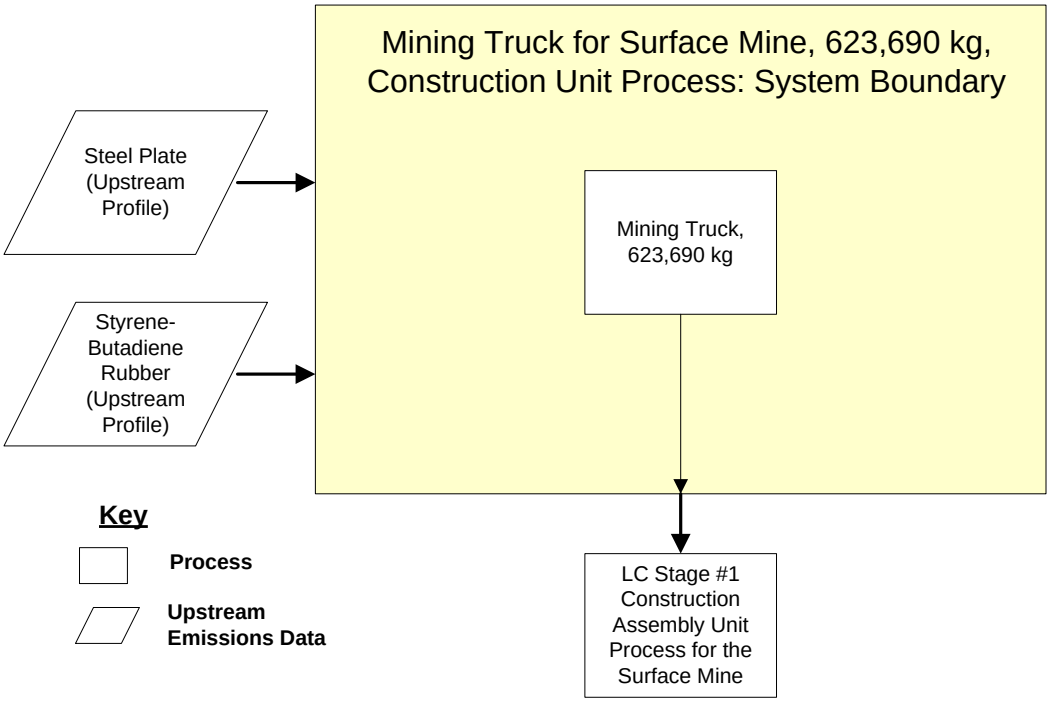

Table 1: Properties of the 623,690 Mining Truck

Total Weight of Single Mining Truck	Weight	Reference
Gross Operating Weight, kg (lb)	623,690 (1,375,000)	Caterpillar 2003
Nominal Payload Capacity, kg (lb)	345,000 (760,595)	Caterpillar 2003
Tire Weight, kg (lb)	31,815 (70,140)	Caterpillar 2003
Empty Truck Weight, kg (lb)	246,875 (544,266)	Caterpillar 2003

Table 2: Unit Process Input and Output Flows

Flow Name*	Value	Units (Per Reference Flow)
Inputs		
Steel Plate, BF (85% Recovery Rate) [Metals]	**246,875**	**kg**
Styrene-butadiene-rubber (SBR) [Plastics]	**31,815**	**kg**
Outputs		
Mining Truck for Surface Mine [Construction]	1.00	piece

* **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

Caterpillar 2003 — Caterpillar. 2003. 797B Mining Truck. Caterpillar. http://www.cat.com/cmms/images/C198751.pdf (accessed December 18, 2009).

Section III: Document Control Information

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