NETL Life Cycle Inventory Data
Process Documentation File

Process Name: Electric Stage Loader, 90 Tons, Construction

Reference Flow: 1 piece (pcs) of Electric Stage Loader, 90 Tons

Brief Description: Based on specifications for a Joy Mining electric stage loader. Assumes stage loader constructed entirely of steel plate, with negligible amounts of other materials.

Section I: Meta Data

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

Year Data Best Represents: 2008

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 (BF) used to construct stage loader, assumes 85% recycled/recovery rate*

Tracked Output Flows:

Electric Stage Loader, 90 Tons	*Construction of a single, 90-ton Joy Mining electric stage loader*

Section II: Process Description

Associated Documentation

This unit process is composed of this document and the data sheet (DS) *DS_Stage1_C_Electric_Stage_Loader_90_Tons_2010.01.xls*, which provides additional details regarding relevant calculations, data quality, and references.

Goal and Scope

The scope of this unit process encompasses the weight of materials necessary to construct a single, 90-short-ton electric stage loader, to be used during the longwall underground mining of Illinois No. 6 bituminous coal. The process is based on the reference flow of a single piece of stage loader, as described below and shown in **Figure 1.** The stage loader is assumed to be constructed entirely of steel plate; other materials are assumed to be negligible.

This unit process is used during Life Cycle (LC) Stage #1 to assist in the mining of Illinois No. 6 bituminous coal from an underground coal mine. It is combined with other longwall mining system equipment construction unit processes in an individual assembly unit process for a longwall miner, DS_Stage1_C_Assembly_Longwall_Miner_System_2010.01.xls. The assembly unit process quantifies the fraction of each piece of longwall mining equipment needed under LC Stage #1 to produce 1 kg of Illinois No. 6 bituminous coal ready for transport (LC Stage #2) to the energy conversion facility (LC Stage #3).

Boundary and Description

Construction of the stage loader is based on communication with an equipment manufacturer for a Joy Mining electric stage loader. The stage loader loads mined coal onto a conveyor belt for transport to the surface.

Figure 1 provides an overview of the boundary of this unit process. Emissions related to the physical assembly of the stage loader (e.g., emitted while putting together the components of a stage loader, 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 stage loader (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 stage loader constructed in this unit process is incorporated into the longwall mining system assembly processes for LC Stage #1 for Illinois No. 6 bituminous coal.

The total weight of a stage loader was readily available, but reliable data for the material breakdown of stage loader subcomponents were not. Therefore, the stage loader was assumed to be composed entirely of steel plate (Steel plate, BF (85% Recovery Rate) [Metals]).

Table 1 shows relevant properties and assumptions used to calculate the amount of steel plate contained in a single stage loader. The manufacturer gave an estimated range of weights from 72,575 to 90,718 kg (160,000 to 200,000 lbs). These weights were averaged to estimate the total weight for one stage loader, approximately 81,647 kg (180,000 lbs) (Bruniany 2008). Based on the assumption that the stage loader is constructed entirely out of steel plate, the total weight is assigned to this material. **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.

Figure 1: Unit Process Scope and Boundary

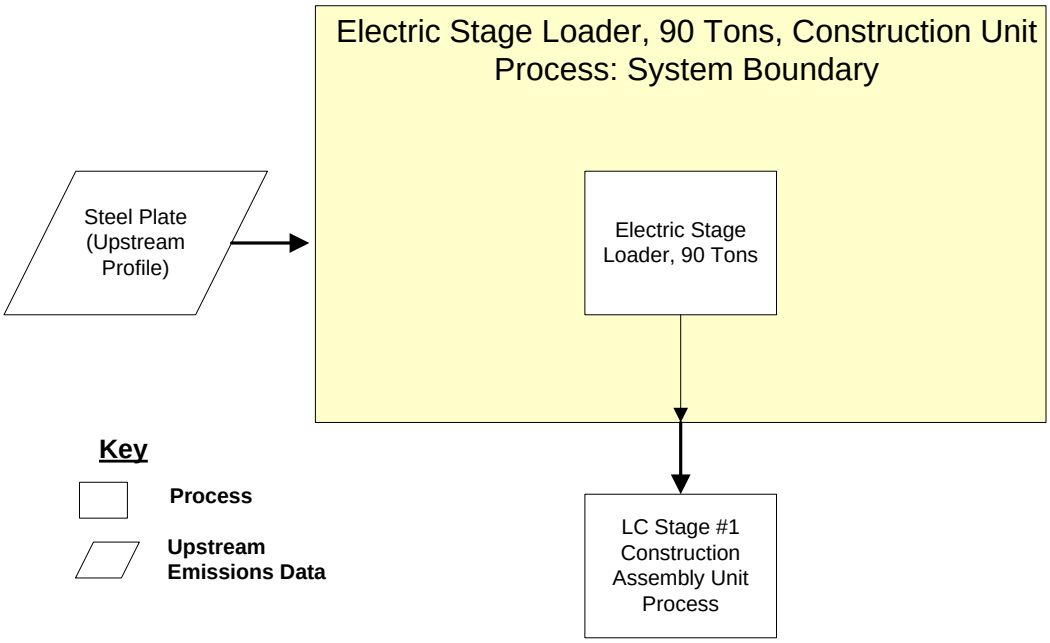

Table 1: Properties of the 90-Ton Electric Stage Loader

Total Weight of Single Stage Loader	Weight	Reference
One Stage Loader Weight, kg (lbs)	81,647 (180,000)	Bruniany 2008
Total Steel Plate in One Stage Loader, kg (lbs)	81,647 (180,000)	NETL Engineering Judgment

Table 2: Unit Process Input and Output Flows

Flow Name*	Value	Units (Per Reference Flow)
Inputs		
Steel Plate, BF (85% Recovery Rate) [Metals]	**81,646.6**	**kg**
Outputs		
Electric Stage Loader, 90 Tons [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

Bruniany 2008 — Bruniany, Cas. 2008. *E-mail Interview*. August 18, 2008.

Section III: Document Control Information

Date Created: January 22, 2010

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