NETL Life Cycle Inventory Data
Process Documentation File

Process Name: Electric Tail Drive, 45 Tons, Construction

Reference Flow: 1 piece (pcs) of Electric Tail Drive, 45 Tons

Brief Description: Based on specifications for a Joy Mining electric tail drive. Assumes tail drive 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 tail drive, assumes 85% recycled/recovery rate*

Tracked Output Flows:

Electric Tail Drive, 45 Tons [Construction]	*Construction of a single, 45 ton, Joy Mining electric tail drive*

Section II: Process Description

Associated Documentation

This unit process is composed of this document and the data sheet (DS) *DS_Stage1_C_Electric_Tail_Drive_45_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, 45 short ton, electric tail drive, to be used during the longwall underground mining of Illinois No. 6 bituminous coal. The process is based on the reference flow of 1 piece of tail drive, as described below and shown in **Figure 1.** The tail drive is assumed to be constructed entirely of steel, and other materials are assumed to be negligible. By default, all steel within this study was assumed to be steel plate, based on available GaBi profiles, unless other steel types were specified per available data, or a higher grade of steel would be required, per NETL engineering judgment. Therefore, all steel considered in this unit process was assumed to be steel plate.

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. This assembly unit process quantifies the fraction of each piece of underground 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 tail drive was based on communication with an equipment manufacturer for a Joy Mining electric tail drive associated with the longwall mining unit.

Figure 1 provides an overview of the boundary of this unit process. Emissions related to the physical assembly of the tail drive (e.g., emitted while putting together the components of a tail drive, 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 tail drive (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 tail drive 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 tail drive was readily available, but reliable data for the material breakdown of tail drive subcomponents were not. Therefore, the tail

drive 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 tail drive. The manufacturer gave a range of weights from 36,287 to 45,359 kg (80,000 to 100,000 lbs). These weights were averaged to estimate the total weight for one tail drive, approximately 40,823 kg (90,000 lbs) (Bruniany 2008). Based on the assumption that the tail drive 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

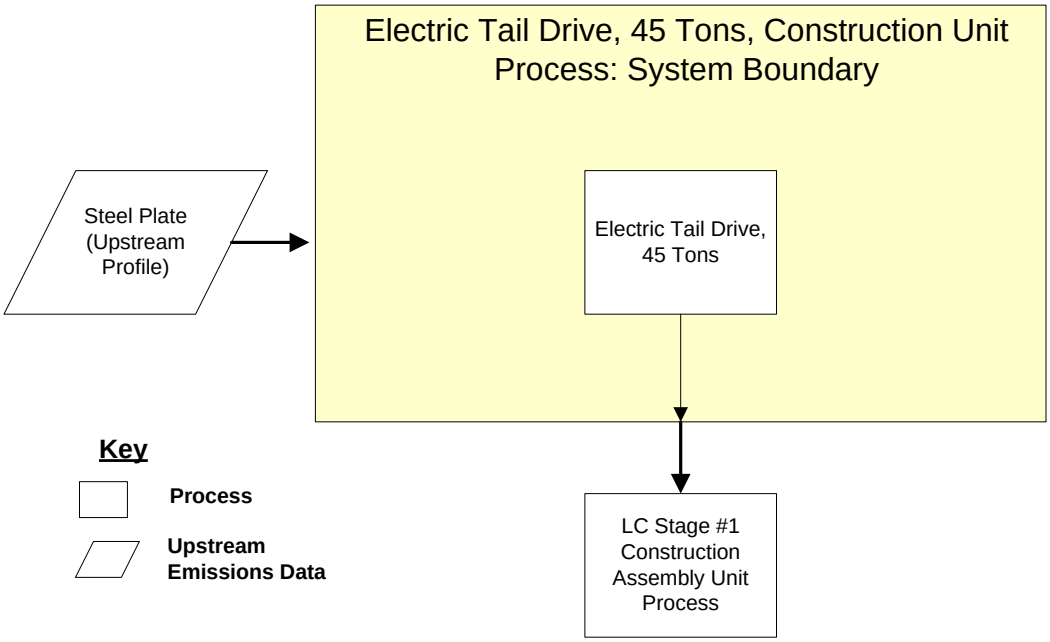

Table 1: Properties of the 45-Ton Electric Tail Drive

Total Weight of Single Tail Drive	Weight	Reference
One Tail Drive Weight, kg (lbs)	40,823 (90,000)	Bruniany 2008
Total Steel Plate in One Tail Drive, kg (lbs)	40,823 (90,000)	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]	**40,823.3**	**kg**
Outputs		
Electric Tail Drive, 45 Ton [Construction]	1	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 19, 2010

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