# NETL Life Cycle Inventory Data
# Process Documentation File

**Process Name:** Electric Head Drive, 65 Tons, Construction

**Reference Flow:** 1 piece (pcs) of Electric Head Drive, 65 Tons

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

**Tracked Output Flows:**

| | |
|---|---|
| Electric Head Drive, 65 Tons [Construction] | *Construction of a single, 65–ton, Joy Mining electric head drive* |

## Section II: Process Description

### Associated Documentation

This unit process is composed of this document and the data sheet (DS) *DS_Stage1_C_Electric_Head_Drive_65_Tons_2010.01.xls*, which provides additional details regarding relevant calculations, data quality, and references.

### Goal and Scope

The scope of this process encompasses the weight of materials necessary to construct a single, 65 short ton electric head drive, to be used during the longwall underground mining of coal. The process is based on the reference flow of 1 piece of head drive, as described below and shown in **Figure 1.** The head drive is assumed to be constructed entirely of steel; 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 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 processes 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 head drive is based on a communication with an equipment manufacturer for a Joy Mining electric head drive.

**Figure 1** provides an overview of the boundary of this unit process. Emissions related to the physical assembly of the head drive (e.g., emitted while putting together the components of a head 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 head 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 head 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 head drive was readily available, but reliable data for the material breakdown of head drive subcomponents were not. Therefore, the head 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 head drive. The manufacturer gave a range of weights from 54,431 to 63,503 kg (120,000 to 140,000 lbs). These weights were averaged to estimate the total weight for one head drive, approximately 58,967 kg (130,000 lbs) (Bruniany 2008). Based on the assumption that the head 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**

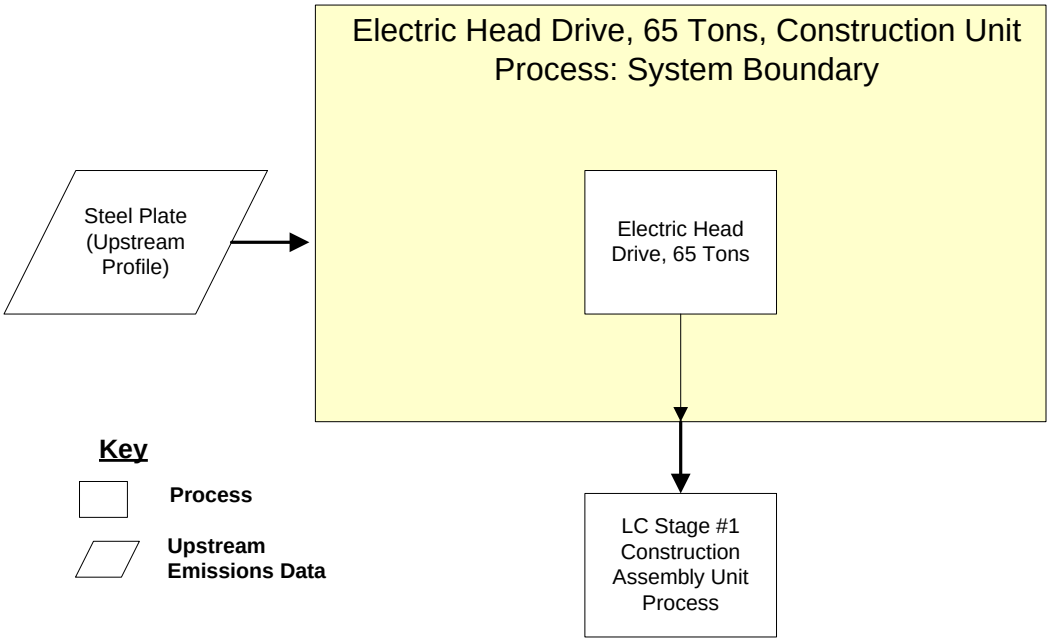


**Table 1: Properties of the 65 Ton Electric Head Drive**

| Total Weight of Single Head Drive | Weight | Reference |
|---|---|---|
| One Head Drive Weight, kg (lbs) | 58,967 (130,000) | Bruniany 2008 |
| Total Steel Plate in One Head Drive, kg (lbs) | 58,967 (130,000) | 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]** | **58,967** | **kg** |
| **Outputs** | | |
| Electric Head Drive, 65 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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Original/no revisions

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