# NETL Life Cycle Inventory Data
# Process Documentation File

**Process Name:** Electric Shearer, 62.5 Tons, Construction

**Reference Flow:** 1 piece (pcs) of Electric Shearer, 62.5 Tons

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

**Tracked Output Flows:**

| | |
|---|---|
| Electric Shearer, 62.5 Tons [Construction] | *Construction of a single, 62.5-ton, Joy Mining electric shearer* |

## Section II: Process Description

### Associated Documentation

This unit process is composed of this document and the data sheet (DS) *DS_Stage1_C_Electric_Shearer_62.5_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, 62.5-short-ton electric shearer, to be used during the longwall underground mining of coal. The process is based on the reference flow of 1 piece of shearer, as described below and shown in **Figure 1.** The shearer is assumed to be constructed entirely of steel plate; other materials are assumed to be negligible.

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 process for underground mining, 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 shearer is based on communication with an equipment manufacturer for a Joy Mining electric shearer. The shearer uses a series of cutting drums/picks to remove coal from the mine face.

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

from 45,359 to 68,039 kg (100,000 to 150,000 lbs). These weights were averaged to estimate the total weight for one shearer, approximately 56,699 kg (125,000 lbs) (Bruniany 2008). Based on the assumption that the shearer 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 details regarding input and output flows, including calculation methods, are contained in the associated DS.

**Figure 1: Unit Process Scope and Boundary**

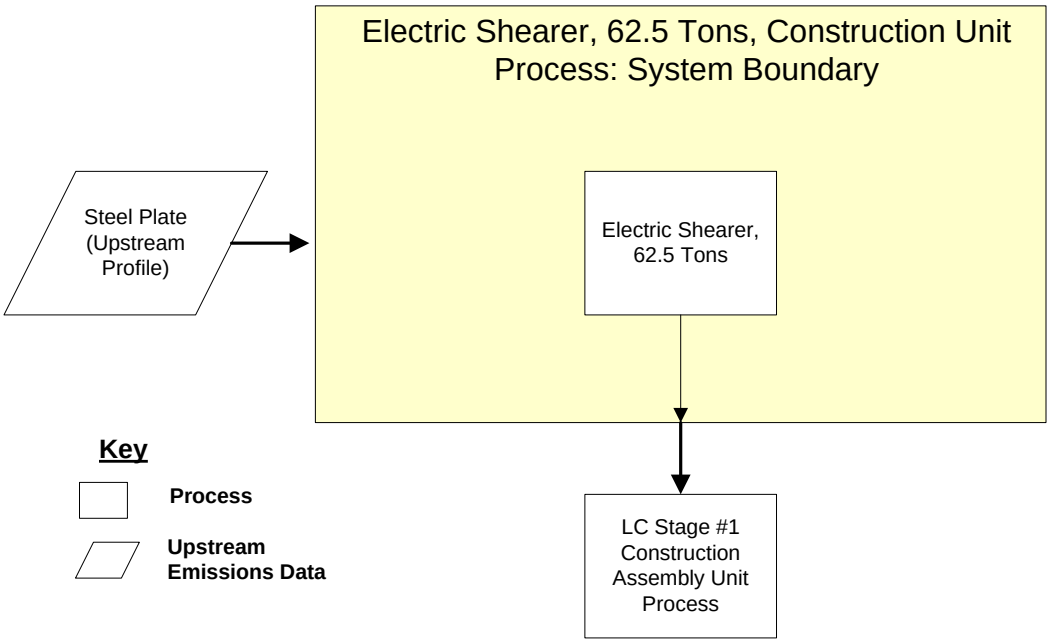


**Table 1: Properties of the 62.5 Ton Electric Shearer**

| Total Weight of Single Shearer | Weight | Reference |
|---|---|---|
| One Shearer Weight, kg (lbs | 56,699 (125,000) | Bruniany 2008 |
| Total Steel Plate in One shearer, kg (lbs) | 56,699 (125,000) | 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]** | **56,699.0** | **kg** |
| **Outputs** | | |
| Electric Shearer, 62.5 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 7, 2010

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**Revision History:**

Original/no revisions

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

NETL (2010). *NETL Life Cycle Inventory Data – Unit Process: Electric Shearer, 62.5 Tons, Construction.* U.S. Department of Energy, National Energy Technology Laboratory. Last Updated: January 2010 (version 01). www.netl.doe.gov/energy-analyses (http://www.netl.doe.gov/energy-analyses)

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