NETL Life Cycle Inventory Data
Process Documentation File

Process Name: Dragline, 8,200 Ton, Construction

Reference Flow: 1 piece (pcs) of Dragline, 8200 ton

Brief Description: Based on manufacturer specifications for a Bucyrus 8750, 8,200 short ton dragline used in mining for a surface mine. This unit process quantifies the amount of steel plate needed to produce the dragline.

Section I: Meta Data

Geographical Coverage: US **Region:** Powder River Basin

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 used to construct baler, assumes 85 percent recycled/recovery rate*

Tracked Output Flows:

Dragline, 8,200 Ton [Construction]	*Construction of a single Bucyrus model 8750, 8,200 ton, dragline*

Section II: Process Description

Associated Documentation

This unit process is composed of this document and the data sheet (DS) *DS_Stage1_C_Dragline_8200ton_2010.01.xls*, which provides additional details regarding calculations, data quality, and references as relevant.

Goal and Scope

The scope of this process encompasses the materials and weights of those materials necessary to construct a single 8,200 ton dragline to be used for the extraction of coal from a surface mine. The process is based on the reference flow of 1 piece of dragline, 8,200 tons, as described below, and as shown in **Figure 1.** The dragline is assumed to be constructed entirely of steel plate; therefore steel plate is assumed to be the only material required for baler construction. Other materials are assumed to be negligible.

This process is used during LC Stage #1 to assist in the mining of coal from surface mines (such as Powder River Basin sub-bituminous coal). It is combined with other coal mining equipment construction unit processes in individual assembly unit process for coal, DF_Stage1_C_Assembly_PRB_Coal_Surface_Mine_2010.01.doc. 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 (LC Stage #3).

Boundary and Description

Construction of the dragline is based on manufacturer specifications for a Bucyrus model 8750, 8,200 ton dragline. The dragline is used to physically remove the overburden of overlaying the coal to be extracted, following blasting.

Figure 1 provides an overview of the boundary of this unit process. Emissions related to the physical assembly of the dragline (e.g., that are emitted while putting together the components of a dragline, 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 dragline (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 dragline constructed in this unit process is incorporated into the surface mine assembly unit process for LC Stage #1 for surface mined Powder River Basin sub-bituminous coal.

The total weight of a dragline was readily available but reliable data for the material breakdown of dragline subcomponents were not. Therefore, the dragline 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 dragline. Total weight for one dragline is estimated by

subtracting the rated standard load (the weight of material that the dragline can carry) from the total working weight (rated standard load plus dragline weight), resulting in a total weight of approximately 7,146,347 kg (15,754,998 lbs) (Bucyrus 2008). Based on the assumption that the dragline 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 sheet.

Figure 1: Unit Process Scope and Boundary

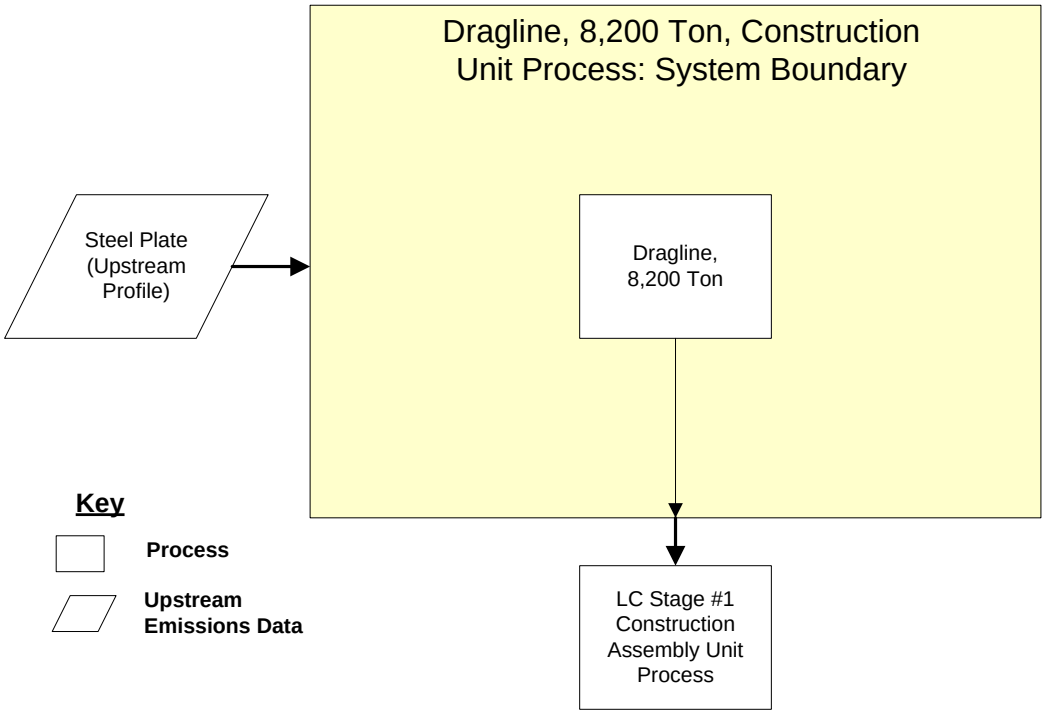

Table 1: Properties of the 8,200 Ton Dragline

Total Weight of Single Baler	Weight	Reference
One Dragline Weight, kg (lbs)	7,164,347 (15,754,998)	Bucyrus 2008
Total Steel Plate in One Dragline, kg (lbs)	7,164,347 (15,754,998)	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]	**7,164,347**	**kg**
Outputs		
Dragline, 8,200 Ton [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

Bucyrus 2008 — Bucyrus International. 2008. Walking Draglines: The range. Bucyrus International. http://www.bucyrus.com/pdf/surface/Draglines%20Trifold%200105.pdf (accessed December 18, 2009).

Section III: Document Control Information

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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*: Dragline, 8,200 tons, Construction. U.S. Department of Energy, National Energy Technology Laboratory. Last Updated: February 2010 (version 01). www.netl.doe.gov/energy-analyses (http://www.netl.doe.gov/energy-analyses)

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