NETL Life Cycle Inventory Data
Process Documentation File

Process Name: Longwall Mining System Assembly, Construction

Reference Flow: 1 piece (pcs) of Longwall Mining System

Brief Description: Calculates the number of each piece of equipment included in a longwall mining system needed to mine coal at an underground, Illinois No.6 bituminous coal mine. Equipment includes shearer, shields, head and tail drives, stage loader, and line pans.

Section I: Meta Data

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

Year Data Best Represents: 2008

Process Type: Basic Process (BP)

Process Scope: Gate-to-Gate Process (GG)

Allocation Applied: No

Completeness: Individual Relevant Flows Captured

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:

Hydraulic Shield, 28.2 Tons, 2 Meter [Installation]	*Total number of 28.2-short-ton, 2-meter hydraulic shields needed to construct a single longwall mining system*
Line Pan, 2.5 Tons [Installation]	*Total number of 2.5-short-ton line pans needed to construct a single longwall mining system*
Electric Head Drive, 65 Tons [Installation]	*Total number of 65-short-ton electric head drives needed to construct a single longwall mining system*
Electric Tail Drive, 45 Tons [Installation]	*Total number of 45-short-ton electric tail drives needed to construct a single longwall mining system*
Electric Shearer, 62.5 Tons [Installation]	*Total number of 62.5-short-ton electric shearers needed to construct a single longwall mining system*
Electric Stage Loader, 90 Tons [Installation]	*Total number of 62.5-short-ton electric stage loaders needed to construct a single longwall mining system*

Tracked Output Flows:

Longwall Mining System [Construction]	*Reference flow*

Section II: Process Description

Associated Documentation

This unit process is composed of this document and the data sheet (DS) *DS_Stage1_C_Assembly_Longwall_Mining_System_2010.01.xls*, which provides additional details regarding relevant calculations, data quality, and references.

Goal and Scope

The scope of this unit process covers the elements required for the construction of a single longwall mining system used to extract Illinois No. 6 bituminous coal from the mine face of an underground longwall coal mine in Life Cycle (LC) Stage #1. After being conveyed to the surface, the coal will be crushed and cleaned, then loaded into railcars for transport (LC Stage #2) to the power plant (LC Stage #3), as described below and in **Figure 1**. Input flows for the longwall mining system construction include shields, line pans, head drives, tail drives, shearers, and stage loaders. This unit process calculates the total number of each type of equipment needed as inputs to construct a single longwall mining system.

Construction data, including the mass of raw materials required to construct a single shield, line pan, head drive, tail drive, shearer, and stage loader, are calculated in separate unit processes. Therefore, the following unit processes are considered to be embedded in this assembly unit process: DF_Stage1_C_Hydraulic_Shield_28.2_Tons_2_Meter_2010.01.doc, DF_Stage1_C_Line_Pan_2.5_Tons_2010.01.doc, DF_Stage1_C_Electric_Head_Drive_65_Tons_2010.01.doc, DF_Stage1_C_Electric_Tail_Drive_45_Tons_2010.01.doc, DF_Stage1_C_Electric_Shearer_62.5_Tons_2010.01.doc, and DF_Stage1_C_Electric_Stage_Loader_90_Tons_2010.01.doc. For a discussion of environmental emissions associated with the manufacture of raw materials used in the construction of longwall mining system components, as well as other pertinent information, please refer to these separate unit processes.

Boundary and Description

Figure 1 provides an overview of the boundary of this unit process. The total number of shields was taken from an article describing a longwall mining system installed at the Mountain Laurel complex in southern West Virginia. The longwall system began producing coal on October 1, 2007. The article stated that there were 176 shields included in the longwall miner (Joy Mining Machinery 2008).

The same article stated that the line pans used in the longwall system were 39 inches (1 meter). Based on the assumption that 2-meter shields were used, there were assumed to be twice as many line pans required as shields (a total of 352).

Each longwall mining system has one head drive, tail drive, electric shearer, and stage loader. The article describing the Mountain Laurel complex stated that there was a single shearer and stage loader (Joy Mining Machinery 2008), and it was assumed there would be a single head drive and single tail drive, one at each end of the line pans.

Relevant properties of a single longwall mining system used for the calculation of input and output flows for this unit process are shown in **Table 1**. **Table 2**

provides a summary of modeled input and output flows. Additional details showing calculation methods for input and output flows, and other relevant information, are contained in the associated DS.

Figure 1: Unit Process Scope and Boundary

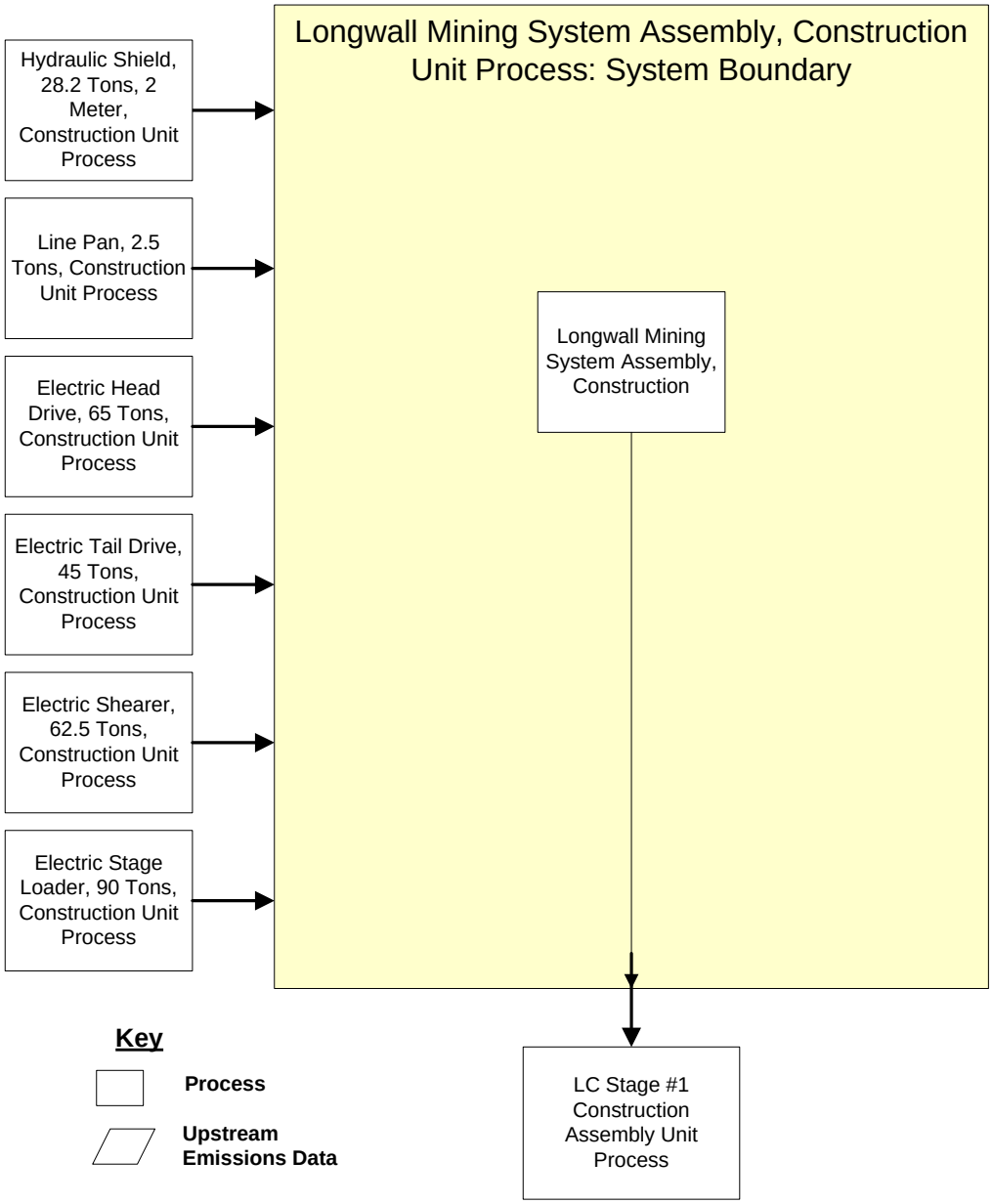

Table 1: Properties of a Single Longwall Mining System

Construction and Replacement Properties		
Property	**Value**	**Units**
Number of Shields	176	shields
Number of Line Pans	352	line pans
Number of Head Drives	1	head drives
Number of Tail Drives	1	tail drives
Number of Shearers	1	shearers
Number of Stage Loaders	1	stage loaders

Table 2: Unit Process Input and Output Flows

Flow Name*	Value	Units (Per Reference Flow)
Inputs		
Hydraulic Shield, 28.2 Tons, 2 Meter [Installation]	**176**	**shields**
Line Pan, 2.5 Tons [Installation]	**352**	**line pans**
Electric Head Drive, 65 Tons [Installation]	**1**	**head drives**
Electric Tail Drive, 45 Tons [Installation]	**1**	**tail drives**
Electric Shearer, 62.5 Tons [Installation]	**1**	**shearers**
Electric Stage Loader, 90 Tons [Installation]	**1**	**stage loaders**
Outputs		
Longwall Mining System [Construction]	1	pcs

* **Bold face** clarifies that the value shown *does not* include upstream environmental flows. See also the documentation for embedded unit processes, as shown below.

Embedded Unit Processes

DF_Stage1_C_Hydraulic_Shield_28.2_Tons_2_Meter_2010.01.doc;

DF_Stage1_C_Line_Pan_2.5_Tons_2010.01.doc;

DF_Stage1_C_Electric_Head_Drive_65_Tons_2010.01.doc;

DF_Stage1_C_Electric_Tail_Drive_45_Tons_2010.01.doc;

DF_Stage1_C_Electric_Shearer_62.5_Tons_2010.01.doc;

DF_Stage1_C_Electric_Stage_Loader_90_Tons_2010.01.doc

References

Joy Mining Machinery 2008 — Joy Mining Machinery. 2008. *New Mountain Laurel Complex Successfully Installs State-of-the-Art JOY Longwall System*. Thomas Publishing Company. http://news.thomasnet.com/companystory/816524 (Accessed December 14, 2009).

Section III: Document Control Information

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