NETL Life Cycle Inventory Data
Process Documentation File

Process Name: UF_6 Storage Container, Construction

Reference Flow: 1 piece of UF_6 Storage Container, Construction

Brief Description: This unit process provides the material inputs for the construction of a steel storage container for UF_6 and DUF_6 storage and transportation. Through the parameters, the size of the container can be varied for the applicable type: 48X, 48Y, or 30B.

Section I: Meta Data

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

Year Data Best Represents: 2005

Process Type: Manufacturing Process (MP)

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:

Container Chooser	Chooses the size of the container based on the value entered; 1 = 48Y, 2 = 48X, 3 = 30B

Tracked Input Flows:

Steel plate, BF (85% Recovery Rate) [Metals]	*Steel used for the construction of the UF_6 storage containers, assumes 85% recover*

Tracked Output Flows:

UF6 Storage Container [Construction]	*Construction of a steel container to store and transport all types of UF_6*

Section II: Process Description

Associated Documentation

This unit process is composed of this document and the data sheet (DS) *DS_Stage1_C_UF6_Storage_Cylinders_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 materials and weights of those materials necessary to construct a single uranium hexafluoride (UF_6) storage cylinder, to be used for the storage and transportation of both natural and enriched UF_6. The process is based on the reference flow of 1 piece of UF_6 storage cylinder, as described below and shown in **Figure 1**. The UF_6 storage cylinder is assumed to be constructed of steel plate. Other materials are assumed negligible.

This process is used during LC Stage #1 to store and transport all different types of UF_6 from naturally occurring to enriched uranium to depleted UF_6. Depending on the usage will depend on which of the types of cylinder should be used. Both 48Y and 48X cylinders can be used to transport natural UF_6, while only the 48Y can store depleted UF_6. 30B is the only cylinder which is approved to carry the enriched uranium to the fuel fabrication facilities. The number of and sizes of the cylinders will be determined by the amount of uranium in each step. This process creates one cylinder of one size.

Boundary and Description

The construction of the UF_6 cylinder is based on information provided in the environmental impact statement for the proposed enrichment facility in Lea County, New Mexico (NRC 2005). The different types of cylinders are designed slightly differently based on the materials they will contain and the function they perform. It is assumed that there is no leakage from any of the cylinders to cause any additional emissions during transport or storage.

Figure 1 provides an overview of the boundary of this unit process. Emissions related to the physical assembly of the UF_6 storage cylinder (e.g., that are emitted while putting together the components of the cylinder, including transportation of these components) are not included in this study. Upstream emissions from the production of raw materials used for the construction of the storage cylinder (e.g., steel) 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 storage cylinder constructed in this unit process is to be used with any type of operations process for nuclear fuel production.

The total weight of a UF_6 storage cylinder was readily available but reliable data for the material breakdown of storage cylinder subcomponents were not. Diagrams and cylinder measurements were used to calculate the quantity of steel plate (Steel plate, BF (85% Recovery Rate) [Metals]).

An adjustable parameter has been created to switch between the different types of cylinders with ease. A “1” is used for a 48Y cylinder. A “2” is used for a 48X cylinder. A “3” is used for a 30B cylinder.

Table 1 shows relevant properties and assumptions used to calculate the amount of steel plate in one UF_6 storage cylinder. **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

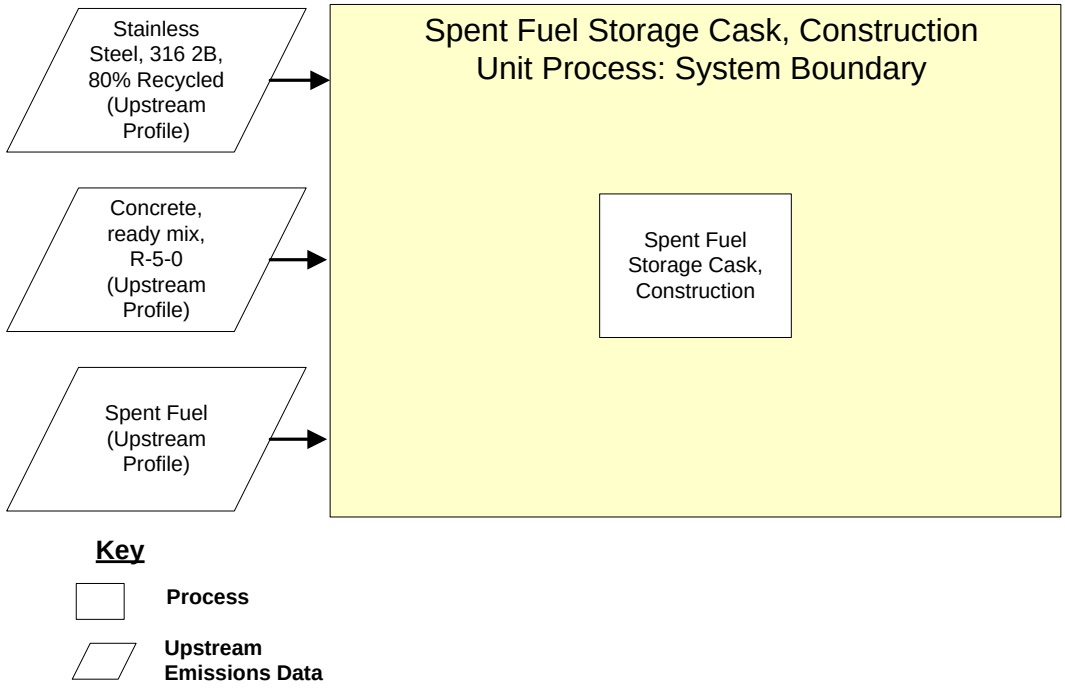

Table 1: Properties of Process

Material Composition and Weights				
Parameter	**Unit**	**Type 48X**	**Type 48Y**	**Type 30B**
Diameter	m	1.2	1.2	0.76
Length	m	3	3.8	2.06
Wall Thickness	mm	16	16	12.7
Empty Weight	kg	2041	2359	635
UF6 Capacity	kg	9540	12500	2277

Table 2: Unit Process Input and Output Flows

Flow Name	Value	Units (Per Reference Flow)
Inputs		
Steel plate, BF (85% Recovery Rate) [Metals]	**635**	**kg/ piece**
Outputs		
UF6 Storage Container [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

NRC 2005 Division of Waste Management and Environmental Protection. 2005. Environmental Impact Statement for Proposed National Enrichment Facility in Lea County, New Mexico: Chapters 1-10 and Appendices A-G (NUREG-1790, Volume 1). U.S. Nuclear Regulatory Commission. Washington, DC. http://www.nrc.gov/reading-rm/doc-collections/nuregs/staff/sr1790/v1/ (Accessed June 14, 2010)

Section III: Document Control Information

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