



NETL Life Cycle Inventory Data

Process Documentation File

Section II: Process Description

Associated Documentation

This unit process is composed of this document and the data sheet (DS) *DS_Stage2,4_O_Petro_WaterCarrier_LoadingUnloading_2010.01.xls*, which provides additional details regarding calculations, data quality, and references as relevant.

Goal and Scope

The scope of this process covers the evaporative emissions of a water carrier (e.g. a fuel tanker ship) during the loading, unloading, and transport of crude oil, gasoline, diesel or jet fuel. The process is based on the reference flow of 1 kg of cargo (any type of the listed fuels) unloaded, as described below, and as shown in **Figure 1**. The process is used during imports and domestic transport as part of either Life Cycle (LC) Stage #2 or LC Stage #4.

When this unit process is used in LC Stage #2, fuel is transported from the location of extraction to the energy conversion facility in LC Stage #3 for processing. Prior to use of this process in LC Stage #2, fuel is transported through a pipeline to the water carrier loading facility. Once the fuel is unloaded from the water carrier, and thus after the scope of this unit process, additional modes of transport are used to deliver the fuel to the energy conversion facility.

When this unit process is used in LC Stage #4, refined fuel is traveling from the energy conversion facility to a vehicle gas tank for LC Stage #5. During LC Stage #4, additional modes of transport (pipeline, tanker truck, and railway) and additional storage processes (bulk storage facility, refueling station) are used. The emissions from these processes and from the operation of the water carrier are calculated outside the boundary of this unit process.

Boundary and Description

This unit process is designed to be independent of the type of petroleum based fuel being transported and the location of fuel origin (domestic or international). The indicated adjustable parameters can be used to dictate the evaporative emissions associated with the desired petroleum fuel. Proportions of fuel loss and VOC emissions for each type of fuel to be transported using this process are shown in **Table 1**. The data in this table are taken from the NETL Petroleum Baseline (NETL 2008) and rely on the assumption that transport occurs over a one-week period. All loss incurred in the transport of gasoline, diesel, and kerosene-based jet fuel is assumed to result in VOC emissions.

Figure 1 provides an overview of the boundary of this unit process. Combustion emissions for transport are considered in an NETL developed operations unit process outside the boundary of the current unit process. Materials used for construction of the water carrier are also considered in an external NETL developed unit process. As shown in **Figure 1** and discussed above, this unit process includes the cargo lost due to

evaporation during loading, unloading and transport. The emissions are based on those found in the Petroleum Baseline study conducted by NETL in 2008.

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

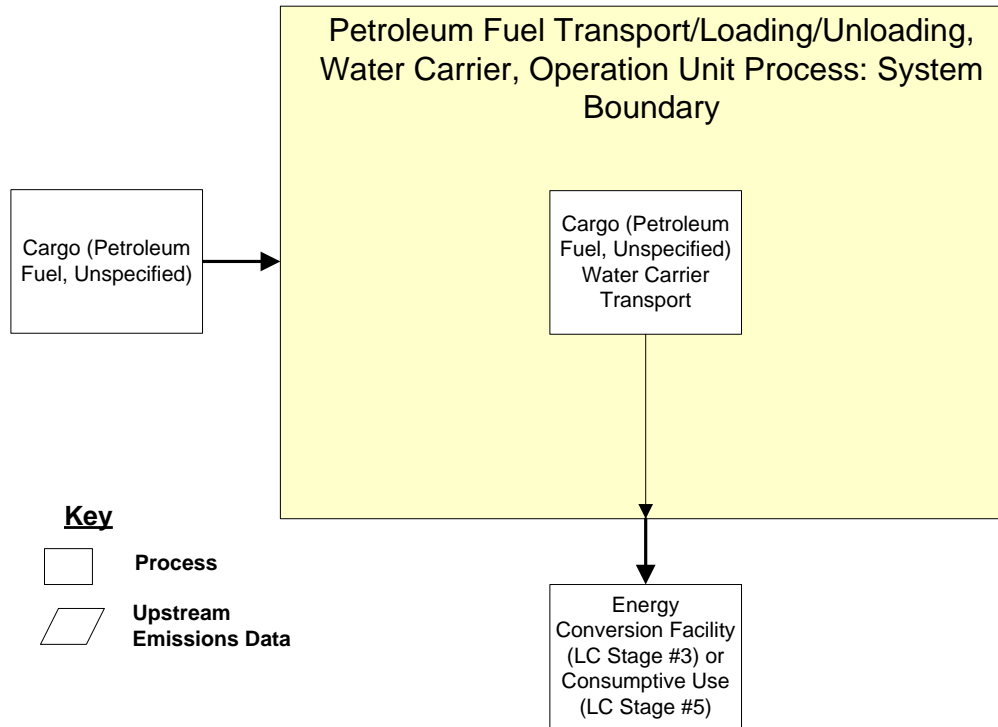


Table 1: Emissions Based on Transported Fuel Type (NETL 2008)

Product	Loading and Waterborne Transport of Imports	Domestic Transport	VOC Emissions, Imports	VOC Emissions, Domestic Transport
Crude Oil	0.285%	0.285%	0.026%	0.026%
Gasoline	0.102%	0.085%	0.102%	0.085%
Diesel	0.000142%	0.000190%	0.000142%	0.000190%
Kerosene-Type Jet Fuel	0.000204%	0.000940%	0.000204%	0.000940%

Section IV: Disclaimer

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