NETL Life Cycle Inventory Data
Process Documentation File

Process Name: Tanker Truck, Petroleum Products, Transportation

Reference Flow: 1 kg of Cargo

Brief Description: This process includes all inputs and outputs for the raw material transportation of 1 kg of petroleum or petroleum-based products, delivered by tanker truck using a diesel-powered tractor.

Section I: Meta Data

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

Year Data Best Represents: 2006

Process Type: Transport Process (TP)

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:

Capacity_gal	*Total amount of liquid fuel transported in one round-trip. This is equivalent to the trailer capacity when loaded.*
Fuel_Density	*Cargo fuel density (3.21 kg/gal for F-T Diesel, 3.17 for conventional Diesel, 2.79 for Gasoline)*
Fuel_Evap	*Mass of fuel cargo that would evaporate during delivery of 1 kg of cargo.*
Trans_Distanz	*Distance from tanker truck cargo origin to cargo destination*

TRUCK_AVE_EMPTY	*Tractor trailer (diesel engine) fuel consumption, loaded*
TRUCK_AVE_LOAD	*Tractor trailer (diesel engine) fuel consumption, loaded*

Tracked Input Flows:

Tanker-Tractor Transport, Operation	*Operation of a tanker-tractor used to transport generic petroleum-based fuels*
Tanker Transport, Construction	*Construction for tanker-tractor used to transport generic petroleum-based fuels*

Tracked Output Flows:

Cargo [Valuable substance]	*Cargo output from the RMT process; cargo is used generically to refer to generic petroleum-based fuels*

Section II: Process Description

Associated Documentation

This unit process is composed of this document and the data sheet (DS) *DS_RMT_Petroleum_Tanker_Truck_2011.01.xls*, which provides additional details regarding relevant calculations, data quality, and references.

Goal and Scope

The scope of this unit process covers all aspects of raw material transportation (RMT), from the downstream boundary of raw materials acquisition (RMA) to the upstream boundary of the energy conversion facility (ECF). At the end of RMT, one kilogram of cargo is delivered to the ECF, the life cycle (LC) Stage #3 boundary.

Boundary and Description

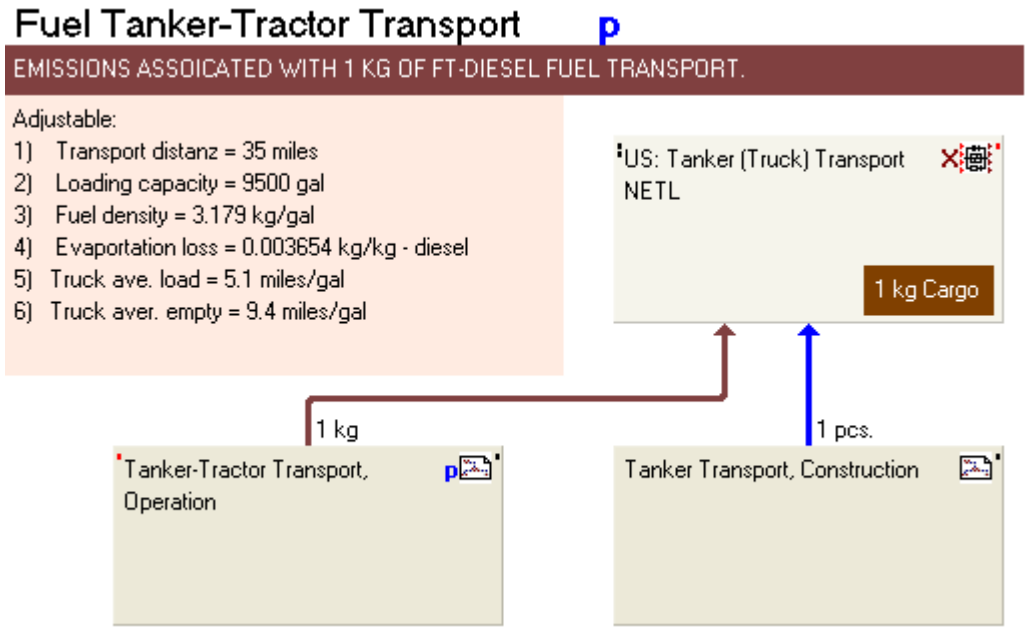
LC Stage #2 (RMT) includes the road transport of petroleum products via tanker truck, and quantifies the transport of generic petroleum products. Petroleum products transported may include crude oil or refined products such diesel, gasoline, and jet fuel. Construction of relevant machinery for RMT is included in this process, as is operation of a tanker truck. Operation of the tractor (i.e., semi-truck) that pulls the tanker trailer is also considered, where the tractor engine is presumed to be diesel powered. Finally, construction and operations processes are combined in an assembly within the GaBi model. The plan for RMT of generic petroleum products via tanker truck is provided in **Figure 1.**

The construction process for machinery used in support of RMT was created in a separate unit process from operations, and construction and operations are

documented in discrete unit processes. The machinery considered includes the following single unit process created by NETL:

- Fuels Tanker Trailer, 7,500 Gallon, Construction
  (DS/DF_Stage2_C_Tanker_Trailer_7500gal _2010.01.doc)

Figure 1: Plan for RMT for Domestic Railroad Transport of Petroleum Products, including Construction and Operation of Profiles for Transport



Each piece of equipment is scaled to the production of one kilogram of tanker unit train assembly. The profiles and processes included in RMT are provided in **Table 1**. Those shown in bold face were developed by NETL.

Table 1: Profiles and Processes Included in RMT for Domestic Railroad Transport of Petroleum Products

Fuel Tanker-Tractor Transport

- Tanker Transport, Construction
  - DE: Lead (99,995%) PE
  - DE: Styrene-butadiene rubber mix (SBR) PE
  - RER: Aluminum sheet mix PE
  - RER: Nylon 6.6 granulate (PA 6.6) ELCD/PlasticsEurope <p-agg>
  - RER: Polyurethane flexible foam (PU) PlasticsEurope
  - US: Fuels Tanker Trailer, 7,500 gallon, Construction NETL <u-so>
  - WOR: Steel Plate, BF, Manufacture NETL <u-so>
- Tanker-Tractor Transport, Operation
  - US: DIESEL, NATIONAL AVERAGE, 2009 NETL <u-so>

US: Tractor-Trailer Liquid Fuels Transport, Class 8B, Operation NETL <u-so>

US: Tanker (Truck) Transport NETL

Parameters and Balances

The parameters for the highest level modeling plans for RMT for railroad transport of petroleum products are shown in **Table 3**. These parameters may or may not include the adjustable parameters shown previously, depending on how the model was created. **Table 4** presents the input and output balances for resources and emissions of interest for the RMT plan.

Table 2: Adjustable Parameters for RMT for Tanker Truck Transport of Petroleum Products

Plan	Parameter	Value	Comment
LC Stage #2			
Fuel Tanker-Tractor Transport	Capacity_gal	9500	[gallons] Total amount of liquid fuel transported in one round-trip
Fuel Tanker-Tractor Transport	Fuel_Density	3.167	[kg/gal] Cargo fuel density (3.21 kg/gal for F-T Diesel, 3.17 for conven. Diesel, 2.79 for gasoline)
Fuel Tanker-Tractor Transport	Fuel_Evap	0.003654	[kg/kg] Amount of petroleum fuel cargo that evaporates during transportation of 1 kg cargo
Fuel Tanker-Tractor Transport	Trans_Distanz	35	[miles] Adjustable parameter for distance from transport origin to destination
Fuel Tanker-Tractor Transport	TRUCK_AVE_EMPTY	9.4	[miles/gal] Unloaded tanker truck (diesel engine) average fuel consumption
Fuel Tanker-Tractor Transport	TRUCK_AVE_LOAD	5.1	[miles/gal] Loaded tanker truck (diesel engine) average fuel consumption

Table 3: Inputs and Output Balances for RMT for Tanker Truck Transport of Petroleum Products (kg/kg delivered)

Process or Category	Gate to Gate (RMT)
Inputs	
Flows	1.403E-02
Resources	1.403E-02
Energy resources	8.034E-04
Non renewable energy resources	8.031E-04
Crude oil (resource)	4.590E-04
Hard coal (resource)	1.258E-04
Lignite (resource)	8.111E-05
Natural gas (resource)	1.372E-04
Uranium (resource)	4.183E-09
Renewable energy resources	3.324E-07

Process or Category	Gate to Gate (RMT)
Biomass	3.150E-07
Renewable fuels	2.878E-13
Wood	1.735E-08
Unspecified	0.000E+00
Land use	0.000E+00
Material resources	1.322E-02
Non renewable elements	1.531E-07
Aluminum	3.785E-13
Chromium	2.014E-11
Copper	4.792E-12
Iron	9.616E-08
Lead	1.940E-11
Magnesium	2.379E-14
Mercury	6.046E-12
Nickel	7.466E-14
Phosphorus	2.377E-09
Sulphur	5.396E-08
Zinc	5.828E-10
Non renewable resources	1.813E-03
Barium sulphate	2.384E-16
Basalt	3.442E-06
Bauxite	2.151E-04
Bentonite	1.883E-06
Calcium carbonate (CaCO3)	2.463E-09
Calcium chloride	2.440E-14
Chalk (Calciumcarbonate)	4.136E-38
Chromium ore (39%)	2.637E-09
Clay	2.137E-07
Colemanite ore	1.367E-09
Copper - Gold - Silver - ore (1,0% Cu; 0,4 g/t Au; 66 g/t Ag)	1.816E-08
Copper - Gold - Silver - ore (1,1% Cu; 0,01 g/t Au; 2,86 g/t Ag)	1.106E-08
Copper - Gold - Silver - ore (1,16% Cu; 0,002 g/t Au; 1,06 g/t Ag)	6.243E-09
Copper - Molybdenum - Gold - Silver - ore (1,13% Cu; 0,02% Mo; 0,01 g/t Au; 2,86 g/t Ag)	1.521E-08
Copper ore (0.14%)	3.722E-08
Copper ore (1.2%)	1.883E-09
Copper ore (4%)	2.282E-18
Copper ore (sulphidic, 1.1%)	1.689E-10
Dolomite	4.926E-07

Process or Category	Gate to Gate (RMT)
Feldspar (aluminum silicates)	1.676E-09
Ferro manganese	4.872E-12
Fluorspar (calcium fluoride; fluorite)	1.616E-06
Granite	5.247E-19
Gypsum (natural gypsum)	1.047E-07
Heavy spar (BaSO4)	4.542E-06
Ilmenite (titanium ore)	4.655E-17
Inert rock	1.475E-03
Iron ore (56,86%)	4.367E-05
Iron ore (65%)	5.064E-09
Kaolin ore	2.453E-09
Lead - zinc ore (4.6%-0.6%)	1.327E-05
Limestone (calcium carbonate)	3.014E-05
Magnesit (Magnesium carbonate)	2.848E-12
Magnesium chloride leach (40%)	2.820E-07
Manganese ore	5.468E-10
Manganese ore (R.O.M.)	3.898E-08
Molybdenite (Mo 0,24%)	9.381E-09
Natural Aggregate	7.735E-06
Nickel ore (1,5%)	4.681E-13
Nickel ore (1.6%)	7.337E-08
Olivine	5.068E-11
Peat	1.547E-07
Phosphate ore	4.980E-12
Phosphorus minerals	2.162E-07
Phosphorus ore (29% P2O5)	2.295E-12
Potassium chloride	3.024E-08
Precious metal ore (R.O.M)	4.649E-10
Quartz sand (silica sand; silicon dioxide)	1.514E-07
Raw pumice	2.932E-11
Rutile (titanium ore)	2.588E-09
sand	6.062E-09
Slate	1.204E-10
Sodium chloride (rock salt)	9.819E-06
Sodium nitrate	1.269E-18
Sodium sulphate	1.651E-10
Soil	2.542E-06
Sulphur (bonded)	1.534E-13

Process or Category	Gate to Gate (RMT)
Talc	6.257E-12
Tin ore	2.067E-17
Titanium ore	8.262E-09
Zinc - copper ore (4.07%-2.59%)	3.676E-07
Zinc - lead - copper ore (12%-3%-2%)	1.813E-06
Zinc - lead ore (4.21%-4.96%)	7.791E-19
Zinc ore (4%)	-3.120E-07
Zinc ore (sulphidic, 4%)	1.059E-17
Renewable resources	1.141E-02
Water	8.037E-03
Water	2.767E-03
Water (feed water)	1.746E-04
Water (ground water)	1.327E-03
Water (sea water)	7.268E-05
Water (surface water)	3.679E-03
Water (well water)	1.689E-05
Water (with river silt)	1.962E-16
Air	3.368E-03
Carbon dioxide	5.426E-06
Nitrogen	9.316E-07
Oxygen	0.000E+00
Unspecified	1.086E-10
Unspecified minerals	2.471E-11
Unspecified resources	8.390E-11
Area of Production Land	0.000E+00
Output	
Flows	1.161E-02
Resources	1.520E-03
Energy resources	0.000E+00
Land use	0.000E+00
Material resources	1.520E-03
Renewable resources	1.520E-03
Water	1.517E-03
Water (river water)	1.504E-03
Water (wastewater)	1.294E-05
Nitrogen	0.000E+00

Process or Category	Gate to Gate (RMT)
Oxygen	2.845E-06
Ecoinvent	4.488E-15
Long-term emission	4.488E-15
Fresh water	4.488E-15
Dissolved organic carbon, DOC (Ecoinvent)	4.488E-15
Production residues in life cycle	2.202E-04
Hazardous waste for disposal	6.224E-05
Dross (Fines)	4.131E-07
Natrium oxide	7.022E-07
Red mud (dry)	6.101E-05
Soil and sand containing heavy metals	8.518E-12
Toxic chemicals (unspecified)	1.182E-07
Hazardous waste for recovery	2.610E-07
Used oil	1.111E-07
Waste water processing residue	1.499E-07
Waste for disposal	5.456E-05
Incineration good	5.976E-08
Sludge from water works (6% dry matter-content)	4.291E-12
Waste (solid)	1.696E-07
Waste from steel works	5.433E-05
Waste for recovery	1.031E-04
Aluminum scrap	1.372E-12
Chemicals (unspecified)	4.493E-08
Cooling water	1.017E-04
Cryolite	1.926E-07
Dross	2.051E-07
Gypsum (FDI)	3.958E-17
Plastic (unspecified)	6.210E-08
Production residues (unspecified)	4.549E-10
Rolling tinder	6.959E-24
Slag	8.825E-07
Waste paper	9.062E-12
Wood	5.942E-11
Wooden pallet (EURO)	2.552E-16
Mixed Waste (Hazardous or Radioactive)	0.000E+00
Neutralized residues	7.497E-18
Emissions to air	9.837E-03
Heavy metals to air	4.305E-09

Process or Category	Gate to Gate (RMT)
Antimony	4.777E-12
Arsenic (+V)	6.552E-11
Arsenic trioxide	2.596E-16
Cadmium (+II)	1.030E-11
Chromium (+III)	8.122E-14
Chromium (unspecified)	1.043E-10
Cobalt	9.798E-12
Copper (+II)	2.242E-11
Heavy metals to air (unspecified)	6.918E-14
Hydrogen arsenic (arsine)	2.155E-14
Iron	1.757E-11
Lanthanides	3.107E-15
Lead (+II)	3.910E-10
Manganese (+II)	5.056E-11
Mercury (+II)	2.307E-11
Molybdenum	1.059E-12
Nickel (+II)	3.707E-10
Palladium	6.755E-19
Rhodium	6.521E-19
Selenium	9.010E-11
Silver	2.601E-17
Tellurium	1.083E-14
Thallium	1.502E-13
Tin (+IV)	5.647E-11
Titanium	1.968E-13
Vanadium (+III)	1.426E-09
Zinc (+II)	1.661E-09
Inorganic emissions to air	3.371E-03
Ammonia	1.064E-08
Ammonium	4.171E-15
Ammonium nitrate	4.968E-16
Barium	2.993E-09
Beryllium	1.442E-12
Boron compounds (unspecified)	1.022E-09
Bromine	3.442E-10
Carbon dioxide	2.130E-03
Carbon dioxide (biotic)	4.143E-07
Carbon disulphide	4.250E-12

Process or Category	Gate to Gate (RMT)
Carbon monoxide	7.690E-06
Chloride (unspecified)	5.913E-10
Chlorine	9.646E-10
Cyanide (unspecified)	4.831E-12
Fluoride	3.055E-08
Fluorides	1.819E-12
Fluorine	1.486E-13
Helium	6.239E-12
Hydrogen	1.326E-08
Hydrogen bromine (hydrobromic acid)	1.266E-12
Hydrogen chloride	3.383E-08
Hydrogen cyanide (prussic acid)	6.427E-12
Hydrogen fluoride	3.069E-08
Hydrogen iodide	1.343E-15
Hydrogen phosphorous	1.012E-12
Hydrogen sulphide	4.069E-08
Lead dioxide	6.278E-15
Nitrogen (atmospheric nitrogen)	1.135E-06
Nitrogen dioxide	1.120E-07
Nitrogen monoxide	1.250E-09
Nitrogen oxides	2.079E-06
Nitrous oxide (laughing gas)	4.939E-08
Oxygen	4.175E-07
Scandium	1.593E-15
Steam	1.224E-03
Strontium	5.909E-14
Sulphur dioxide	4.564E-06
Sulphur hexafluoride	5.445E-14
Sulphuric acid	9.716E-12
Tin oxide	6.780E-17
Unspecified Particles	2.022E-10
Zinc oxide	1.356E-16
Zinc sulphate	5.424E-13
Organic emissions to air (group VOC)	3.659E-03
Group NMVOC to air	1.029E-06
Group PAH to air	2.761E-09
Anthracene	6.294E-14
Benzo{a}anthracene	3.167E-14

Process or Category	Gate to Gate (RMT)
Benzo{a}pyrene	4.563E-11
Benzo{ghi}perylene	2.825E-14
Benzofluoranthene	5.651E-14
Chrysene	7.780E-14
Dibenz(a)anthracene	1.760E-14
Indeno[1,2,3-cd]pyrene	2.102E-14
Naphthalene	6.611E-12
Phenanthrene	2.077E-12
Polycyclic aromatic hydrocarbons (PAH)	2.706E-09
Halogenated organic emissions to air	7.629E-09
Dichloroethane (ethylene dichloride)	7.094E-15
Dichloromethane (methylene chloride)	2.583E-13
Dioxins (unspec.)	-4.330E-16
Halogenated hydrocarbons (unspecified)	3.081E-11
Polychlorinated biphenyls (PCB unspecified)	4.611E-14
Polychlorinated dibenzo-p-dioxins (2,3,7,8 - TCDD)	5.341E-16
R 11 (trichlorofluoromethane)	3.058E-11
R 114 (dichlorotetrafluoroethane)	3.132E-11
R 116 (hexafluoroethane)	7.516E-10
R 12 (dichlorodifluoromethane)	6.575E-12
R 13 (chlorotrifluoromethane)	4.128E-12
R 22 (chlorodifluoromethane)	7.186E-12
Tetrafluoromethane	6.765E-09
Vinyl chloride (VCM; chloroethene)	1.737E-12
Acetaldehyde (Ethanal)	3.192E-10
Acetic acid	1.346E-09
Acetone (dimethylcetone)	3.158E-10
Acrolein	4.442E-13
Aldehyde (unspecified)	1.731E-11
Alkane (unspecified)	2.485E-09
Alkene (unspecified)	1.353E-09
Aromatic hydrocarbons (unspecified)	4.219E-10
Benzene	7.856E-10
Butadiene	4.016E-15
Butane	4.133E-08
Butane (n-butane)	1.292E-09
Caprolactam	2.191E-14
Cyclohexane (hexahydro benzene)	3.111E-12

Process or Category	Gate to Gate (RMT)
Diethylamine	1.043E-19
Ethane	1.180E-07
Ethanol	6.163E-10
Ethene (ethylene)	2.099E-11
Ethyl benzene	1.298E-09
Fluoranthene	2.050E-13
Fluorene	6.506E-13
Formaldehyde (methanal)	2.324E-09
Heptane (isomers)	1.260E-09
Hexamethylene diamine (HMDA)	2.362E-16
Hexane (isomers)	1.440E-08
Mercaptan (unspecified)	2.267E-11
Methanethiol	5.142E-12
Methanol	5.965E-10
NMVOC (unspecified)	6.122E-07
Octane	6.931E-10
Pentane (n-pentane)	1.706E-08
Phenol (hydroxy benzene)	7.776E-14
Propane	1.946E-07
Propene (propylene)	1.284E-10
Propionic acid (propane acid)	5.112E-14
Styrene	2.438E-13
Toluene (methyl benzene)	6.170E-10
Trimethylbenzene	6.605E-16
Xylene (dimethyl benzene)	5.427E-09
Hydrocarbons (unspecified)	2.264E-08
Methane	3.493E-06
Organic chlorine compounds	3.835E-11
Unspecified Organic Compounds	1.406E-16
VOC (unspecified)	3.654E-03
Other emissions to air	2.806E-03
Aldehydes, unspecified	7.028E-17
Exhaust	2.647E-03
Particulate Matter, unspecified	1.286E-08
Sand (Silica) (SiO2)	1.340E-12
Used air	1.593E-04
Particles to air	1.070E-06
Dust (PM10)	4.284E-08

Process or Category	Gate to Gate (RMT)
Dust (PM2.5)	7.898E-08
Dust (unspecified)	9.482E-07
Metals (unspecified)	5.653E-11
Unspecified Organic Chlorine Compounds	9.273E-16
Wood (dust)	2.503E-14
Radioactive emissions to air	3.593E-11
Uranium (total)	3.593E-11
Unspecified Heavy Metals	7.242E-20
Emissions to fresh water	2.309E-05
Analytical measures to fresh water	3.630E-07
Adsorbable organic halogen compounds (AOX)	3.282E-10
Biological oxygen demand (BOD)	1.908E-08
Chemical oxygen demand (COD)	2.648E-07
Nitrogenous Matter (unspecified, as N)	5.627E-09
Solids (dissolved)	4.385E-08
Total dissolved organic bounded carbon	1.435E-08
Total organic bounded carbon	1.493E-08
Heavy metals to fresh water	3.007E-06
Aluminium	5.202E-07
Antimony	4.609E-09
Arsenic (+V)	1.480E-08
Cadmium (+II)	1.474E-09
Chromium (+III)	1.142E-11
Chromium (+VI)	4.022E-13
Chromium (unspecified)	2.559E-08
Cobalt	4.041E-13
Copper (+II)	2.156E-08
Heavy metals to water (unspecified)	1.681E-12
Iron	1.280E-06
Lead (+II)	5.005E-08
Manganese (+II)	3.933E-10
Mercury (+II)	2.521E-10
Molybdenum	8.705E-11
Nickel (+II)	3.954E-07
Selenium	1.601E-11
Silver	4.501E-09
Strontium	1.805E-09
Thallium	9.245E-15

Process or Category	Gate to Gate (RMT)
Tin (+IV)	1.355E-12
Titanium	9.535E-12
Unspecified Substance	6.265E-16
Vanadium (+III)	2.896E-11
Zinc (+II)	6.860E-07
Inorganic emissions to fresh water	1.641E-05
Acid (calculated as H+)	4.281E-08
Aluminum (+III)	2.816E-09
Ammonia	3.698E-09
Ammonium (total N)	5.631E-06
Ammonium / ammonia	1.159E-08
Barium	3.998E-10
Beryllium	1.076E-13
Boron	6.905E-10
Bromate	3.450E-13
Bromine	6.213E-14
Calcium (+II)	6.231E-07
Carbonate	3.086E-08
Chlorate	3.452E-10
Chloride	6.367E-06
Chlorine (dissolved)	3.866E-09
Copper ion (+II/+III)	6.325E-17
Cyanide	4.193E-08
Fluoride	2.818E-07
Fluorine	4.176E-12
Hydrogen chloride	8.398E-14
Hydrogen fluoride (hydrofluoric acid)	7.188E-14
Hydrogen Ions (H+)	1.399E-13
Hydroxide	1.318E-07
Inorganic salts and acids (unspecified)	1.727E-20
Magnesium (+III)	2.224E-08
Magnesium chloride	1.838E-13
Metal ions (unspecific)	1.551E-08
Neutral salts	1.909E-13
Nitrate	1.518E-07
Nitrate (as total N)	2.246E-15
Nitrogen	6.821E-09
Nitrogen organic bounded	1.843E-09

Process or Category	Gate to Gate (RMT)
Phosphate	2.985E-10
Phosphorus	5.017E-07
Potassium	1.299E-09
Silicate particles	2.814E-14
Sodium (+I)	1.820E-06
Sodium chloride (rock salt)	3.645E-13
Sodium hypochlorite	1.362E-12
Sulphate	7.154E-07
Sulphide	4.567E-09
Sulphite	1.951E-10
Sulphur	3.836E-11
Sulphuric acid	1.083E-11
Unspecified Iron Oxides	1.604E-15
Unspecified Oil	5.683E-15
Unspecified Organic Chlorine compounds	1.288E-17
Unspecified Salt	5.153E-14
Unspecified Solids (Suspended)	2.001E-13
Organic emissions to fresh water	1.724E-08
Halogenated organic emissions to fresh water	3.662E-13
1,2-Dibromoethane	7.309E-16
Chlorinated hydrocarbons (unspecified)	1.607E-19
Chloromethane (methyl chloride)	3.646E-13
Dichloroethane (ethylene dichloride)	2.856E-17
Dichloropropane	1.896E-19
Polychlorinated dibenzo-p-dioxins (2,3,7,8 - TCDD)	1.169E-18
Vinyl chloride (VCM; chloroethene)	8.931E-16
Hydrocarbons to fresh water	3.415E-09
Acenaphthene	7.537E-14
Acenaphthylene	3.128E-14
Acetic acid	9.712E-11
Acrylonitrile	1.387E-14
Anthracene	1.115E-13
Aromatic hydrocarbons (unspecified)	4.311E-11
Benzene	1.516E-10
Benzo{a}anthracene	1.056E-14
Benzofluoranthene	5.387E-15
Chrysene	4.687E-14
Cresol (methyl phenol)	9.933E-13

Process or Category	Gate to Gate (RMT)
Ethyl benzene	7.867E-12
Fluoranthene	1.294E-14
Hexane (isomers)	1.085E-13
Hydrocarbons (unspecified)	1.092E-09
Methanol	5.047E-10
Oil (unspecified)	9.707E-10
Phenol (hydroxy benzene)	1.956E-10
Polycyclic aromatic hydrocarbons (PAH, unspec.)	2.142E-10
Toluene (methyl benzene)	9.507E-11
Xylene (isomers; dimethyl benzene)	4.256E-11
Carbon, organically bound	5.695E-09
Naphthalene	4.712E-12
N-unspecified (N)	4.448E-15
Organic chlorine compounds (unspecified)	6.817E-12
Organic compounds (dissolved)	7.419E-09
Organic compounds (unspecified)	6.921E-10
Unspecified wastewater	3.363E-12
Other emissions to fresh water	0.000E+00
Particles to fresh water	3.293E-06
Metals (unspecified)	2.747E-10
Silicon dioxide (silica)	8.973E-16
Soil loss by erosion into water	1.343E-12
Solids (suspended)	3.283E-06
Suspended solids, unspecified	9.891E-09
Unspecified Oxides	1.334E-15
Radioactive emissions to fresh water	0.000E+00
Bromide	0.000E+00
Radionuclide	0.000E+00
Sulfite	0.000E+00
Unspecified Solids (Dissolved)	3.856E-13
Uranium (total)	0.000E+00
Emissions to sea water	8.884E-06
Analytical measures to sea water	3.012E-08
Adsorbable organic halogen compounds (AOX)	1.760E-15
Biological oxygen demand (BOD)	1.942E-09
Chemical oxygen demand (COD)	2.624E-08
Total organic bounded carbon	1.942E-09
Heavy metals to sea water	6.235E-09

Process or Category	Gate to Gate (RMT)
Arsenic (+V)	7.231E-11
Cadmium (+II)	3.672E-11
Chromium (unspecified)	1.224E-10
Cobalt	2.044E-11
Copper (+II)	2.104E-10
Iron	5.014E-10
Lead (+II)	5.509E-11
Manganese (+II)	5.087E-11
Mercury (+II)	8.229E-13
Molybdenum	1.945E-12
Nickel (+II)	7.483E-11
Silver	5.772E-12
Strontium	4.660E-09
Tin (+IV)	6.914E-12
Titanium	7.042E-13
Vanadium (+III)	1.490E-11
Zinc (+II)	3.988E-10
Inorganic emissions to sea water	7.297E-06
Aluminum (+III)	2.267E-11
Ammonia	6.737E-10
Barium	1.413E-09
Beryllium	1.061E-12
Boron	3.666E-10
Calcium (+II)	4.003E-08
Carbonate	8.886E-08
Chloride	7.063E-06
Magnesium	1.000E-08
Nitrate	1.152E-10
Sodium (+I)	3.878E-08
Sulphate	3.762E-08
Sulphide	1.615E-08
Sulphur	1.962E-10
Organic emissions to sea water	4.449E-09
Hydrocarbons to sea water	4.411E-09
Acenaphthene	1.094E-12
Acenaphthylene	4.202E-13
Acetic acid	2.354E-12
Anthracene	4.039E-13

Process or Category	Gate to Gate (RMT)
Aromatic hydrocarbons (unspecified)	1.942E-11
Benzene	4.308E-10
Benzo{a}anthracene	2.372E-13
Benzofluoranthene	2.552E-13
Chrysene	1.323E-12
Cresol (methyl phenol)	5.081E-12
Ethyl benzene	3.201E-11
Fluoranthene	2.771E-13
Hexane (isomers)	5.547E-13
Oil (unspecified)	2.959E-09
Phenol (hydroxy benzene)	5.427E-10
Toluene (methyl benzene)	2.739E-10
Xylene (isomers; dimethyl benzene)	1.406E-10
Naphthalene	3.850E-11
Particles to sea water	1.545E-06
Solids (suspended)	1.545E-06
Emissions to agricultural soil	0.000E+00
Emissions to industrial soil	4.268E-08
Heavy metals to industrial soil	1.047E-08
Arsenic (+V)	1.317E-14
Cadmium (+II)	9.142E-13
Chromium (+III)	1.793E-11
Chromium (unspecified)	3.099E-11
Cobalt	5.309E-13
Copper (+II)	1.823E-11
Iron	4.361E-11
Lead (+II)	2.691E-11
Manganese (+II)	7.995E-12
Mercury (+II)	1.799E-13
Nickel (+II)	2.353E-11
Strontium	1.022E-08
Zinc (+II)	7.529E-11
Inorganic emissions to industrial soil	3.194E-08
Aluminum (+III)	3.592E-11
Ammonia	1.606E-08
Bromide	4.550E-12
Calcium (+II)	8.014E-10
Chloride	5.354E-09

Process or Category	Gate to Gate (RMT)
Fluoride	1.517E-10
Magnesium (+III)	1.108E-10
Phosphorus	1.663E-09
Potassium (+I)	3.980E-09
Sodium (+I)	7.009E-11
Sulphate	5.302E-10
Sulphide	3.181E-09
Organic emissions to industrial soil	2.746E-10
Oil (unspecified)	2.746E-10
Radioactive emissions to industrial soil	0.000E+00
Calcium Fluoride	0.000E+00
Radionuclide	0.000E+00

Embedded Unit Processes

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References

None.

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