NETL Life Cycle Inventory Data
Process Documentation File

Process Name: Disposal Produced Water Switch

Reference Flow: 1 L of Produced Water

Brief Description: This unit process acts as a switch to send produced water waste from all natural gas well types to the appropriate water treatment plant options.

Section I: Meta Data

Geographical Coverage: U.S. **Region:** Appalachian, Gulf Coast, Arkla, East Texas, Arkoma, South Oklahoma Folded Belt, Anadarko, Strawn, Fort Worth Syncline, Permian, Green River, Uinta, San Juan, Piceance

Year Data Best Represents:

Process Type: Waste Treatment Process (WT)

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

Allocation Applied: No

Completeness: All 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:

Produced_Volume_Flow

[Reference Flow]

Produced_Injection_Enhanced_Recovery_Percent

Fraction of produced water that will be injected for enhanced recovery

Produced_Injection_Disposal_Percent

Fraction of produced water that will be injected for disposal

Produced_Surface_Discharge_Percent

Fraction of produced water that will be surface discharged

Produced_Cent_Waste_Trt_Discharge_Percent

Fraction of produced water that will be sent to a centralized waste treatment plant and discharged

Produced_Reuse_Not_Road_Percent

Fraction of produced water that will be reused in a capacity other than road spreading

Produced_Public_Sewage_Trt_Plant_Percent

Fraction of produced water that will be sent to a public sewage treatment plant

Produced_Reuse_Road_Spreading_Percent

Fraction of produced water that will be reused for road spreading

Produced_Resid_Waste_Proces_Facility_Percent

Fraction of produced water that will be sent to a residual waste processing facility

Produced_Cent_Waste_Trt_Recycle_Percent

Fraction of produced water that will be sent to a centralized waste treatment plant and recycled

P_Volume_Injection_Enhanced_Recovery

Volume flow of produced water that will be injected for enhanced recovery

P_Volume_Injection_Disposal

Volume flow of produced water that will be injected for disposal

P_Volume_Surface_Discharge

Volume flow of produced water that will be surface discharged

P_Volume_Cent_Waste_Trt_Discharge

Volume flow of produced water that will be sent to a centralized waste treatment plant and discharged

P_Volume_Reuse_Not_Road

Volume flow of produced water that will be reused in a capacity other than road spreading

P_Volume_Public_Sewage_Trt_Plant

Volume flow of produced water that will be sent to a public sewage treatment plant

P_Volume_Reuse_Road_Spreading

Volume flow of produced water that will be reused for road spreading

P_Volume_Resid_Waste_Proces_Facility

Volume flow of produced water that will be sent to a residual waste processing facility

P_Volume_Cent_Waste_Trt_Recycle

Volume flow of produced water that will be sent to a centralized waste treatment plant and recycled

Tracked Input Flows:

Tracked Output Flows:

Water (produced, enhanced recovery) [intermediate flow]

Water (produced, injection disposal) [intermediate flow]

Water (produced, Centralized Waste Treatment Discharge) [intermediate flow]

Water (produced,Public Sewage Treatment) [intermediate flow]

Water (produced, Residual Waste Processing) [intermediate flow]

Water (produced, Centralized Waste Treatment Recycle) [intermediate flow]

Section II: Process Description

Associated Documentation

This unit process is composed of this document and the data sheet (DS) *DS_NG_Production_Disposal_Produced_2018.01*, which provides additional details regarding relevant calculations, data quality, and references.

Goal and Scope

This unit process provides a summary of relevant input and output flows associated with determining the disposal destination of produced water from natural gas wells. The reference flow of this unit process is: 1 L of Produced Water

Boundary and Description

This unit process can be thought of as a switch or a mixer for dealing with produced water generated from natural gas wells. It calculates the volume of water sent to each final destination per 1 L of produced water generated.

Figure 1: Unit Process Scope and Boundary

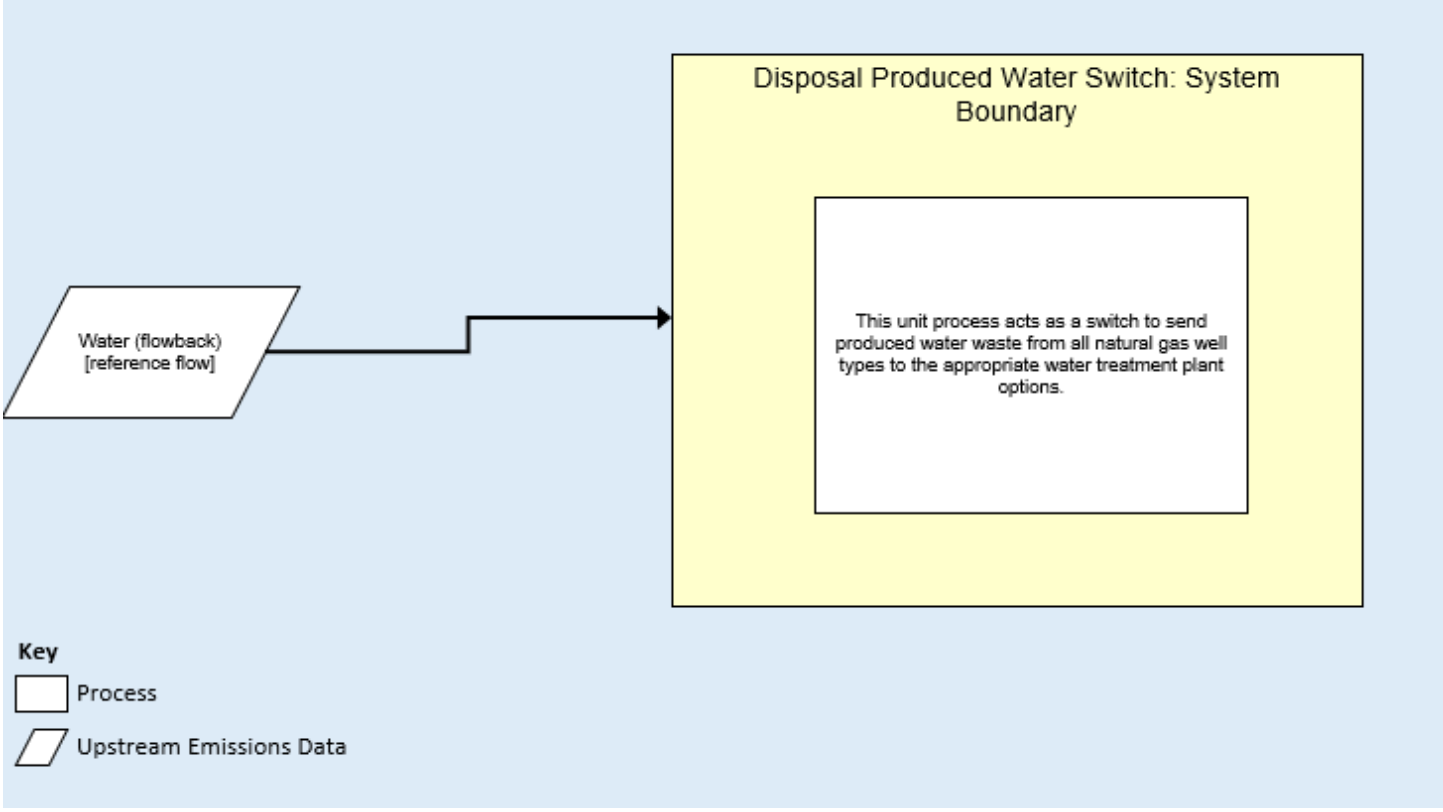

Table 1: Parameter Scenarios, Shown as Fractions

Scenario	Injection for Enhanced Recovery	Injection for Disposal	Surface Discharge	Reuse, not Road Spreading	Residual Waste Processing Facility	Centralized Waste Treatment Plant with Recycle
Anadarko - Conventional	0.43	0.57	0.00	0.00	0.00	0.00
Anadarko - Shale	0.43	0.57	0.00	0.00	0.00	0.00
Anadarko - Tight	0.43	0.57	0.00	0.00	0.00	0.00
Uinta-Conventional	0.47	0.38	0.15	0.00	0.00	0.00
Appalachian - Shale	0.00	0.06	0.00	0.59	0.17	0.18
Arkla - Conventional	0.10	0.90	0.00	0.00	0.00	0.00
Arkla - Shale	0.10	0.90	0.00	0.00	0.00	0.00
Arkla - Tight	0.10	0.90	0.00	0.00	0.00	0.00
Arkoma - Conventional	0.28	0.72	0.00	0.00	0.00	0.00
Arkoma - Shale	0.28	0.72	0.00	0.00	0.00	0.00
East Texas - Conventional	0.68	0.32	0.00	0.00	0.00	0.00
East Texas - Shale	0.68	0.32	0.00	0.00	0.00	0.00
East Texas - Tight	0.68	0.32	0.00	0.00	0.00	0.00
Fort Worth - Shale	0.68	0.32	0.00	0.00	0.00	0.00
Green River - Conventional	0.50	0.50	0.00	0.00	0.00	0.00
Green River - Tight	0.50	0.50	0.00	0.00	0.00	0.00
Gulf Coast - Conventional	0.39	0.61	0.00	0.00	0.00	0.00
Gulf Coast - Shale	0.39	0.61	0.00	0.00	0.00	0.00
Gulf Coast - Tight	0.39	0.61	0.00	0.00	0.00	0.00
Permian - Conventional	0.68	0.32	0.00	0.00	0.00	0.00
Permian - Shale	0.68	0.32	0.00	0.00	0.00	0.00
Piceance - Tight	0.50	0.50	0.00	0.00	0.00	0.00
San Juan - Conventional	0.56	0.44	0.00	0.00	0.00	0.00
San Juan - CBM	0.00	1.00	0.00	0.00	0.00	0.00
South Oklahoma - Shale	0.43	0.57	0.00	0.00	0.00	0.00
Strawn - Shale	0.68	0.32	0.00	0.00	0.00	0.00
Uinta-Tight	0.47	0.38	0.15	0.00	0.00	0.00

Table 2: Unit Process Input and Output Flows

Flow Name	Value	Units (Per Reference Flow)	DQI
Inputs			
Outputs			
Water (produced, enhanced recovery) [intermediate flow]	0.43	L	2,2,3,2,1
Water (produced, injection disposal) [intermediate flow]	0.57	L	2,2,3,2,1
Water (produced, surface discharge) [waste]	0.00	L	2,2,3,2,1
Water (produced, Centralized Waste Treatment Discharge) [intermediate flow]	0.00	L	2,2,3,2,1
Water (produced, reuse not road spread) [recycle]	0.00	L	2,2,3,2,1
Water (produced,Public Sewage Treatment) [intermediate flow]	0.00	L	2,2,3,2,1
Water (produced, Reuse Road Spreading) [waste]	0.00	L	2,2,3,2,1
Water (produced, Residual Waste Processing) [intermediate flow]	0.00	L	2,2,3,2,1
Water (produced, Centralized Waste Treatment Recycle) [intermediate flow]	0.00	L	2,2,3,2,1

* **Bold face** clarifies that the value shown *does not* include upstream environmental flows.

Note: Inventory items not included are assumed to be zero based on best engineering judgment or assumed to be zero because no data was available to categorize them for this unit process at the time of its creation.

Embedded Unit Processes

None.

References

ANL. 2009. Produced water volumes and management practices in the United States. A.N.L. (ANL).

PA DEP. n.d. Oil and Gas Reporting Wesbite - Production/Waste Reports. P.D.o.E. Protection. https://www.paoilandgasreporting.state.pa.us/publicreports/Modules/Welcome/ProdWasteReports.aspx Accessed July 18, 2018

Section III: Document Control Information

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