NETL Life Cycle Inventory Data
Process Documentation File

Process Name: Disposal Flowback Water Switch

Reference Flow: 1 L of Flowback Water

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

Section I: Meta Data

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

Year Data Best Represents: 2009-2016

Process Type: Waste Treatment Process (WT)

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

Allocation Applied: No

Completeness: All 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:

Flowback_Volume_Flow

[Reference Flow]

Flowback_Injection_Enhanced_Recovery_Percent

Fraction of flowback water that will be injected for enhanced recovery

Flowback_Injection_Disposal_Percent

Fraction of flowback water that will be injected for disposal

Flowback_Surface_Discharge_Percent

Fraction of flowback water that will be surface discharged

Flowback_Reuse_Not_Road_Percent

Fraction of flowback water that will be reused for something other than road use

Flowback_Resid_Waste_Proces_Facility_Percent

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

Flowback_Cent_Waste_Trt_Plant_Recycle_Percent

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

F_Volume_Injection_Enhanced_Recovery

Volume of flowback water that will be injected for enhanced recovery

F_Volume_Injection_Disposal

Volume of flowback water that will be injected for disposal

F_Volume_Surface_Discharge

Volume of flowback water that will be surface discharged

F_Volume_Reuse_Not_Road

Volume of flowback water that will be reused for something other than road use

F_Volume_Resid_Waste_Proces_Facility

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

F_Volume_Cent_Waste_Trt_Plant_Recycle

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

Tracked Input Flows:

Tracked Output Flows:

Water (flowback, enhanced recovery) [intermediate flow]

Water (flowback, injection disposal) [intermediate flow]

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

Water (flowback, 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_Flowback_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 flowback water from shale and tight natural gas wells. The reference flow of this unit process is: 1 L of Flowback Water

Boundary and Description

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

Figure 1: Unit Process Scope and Boundary

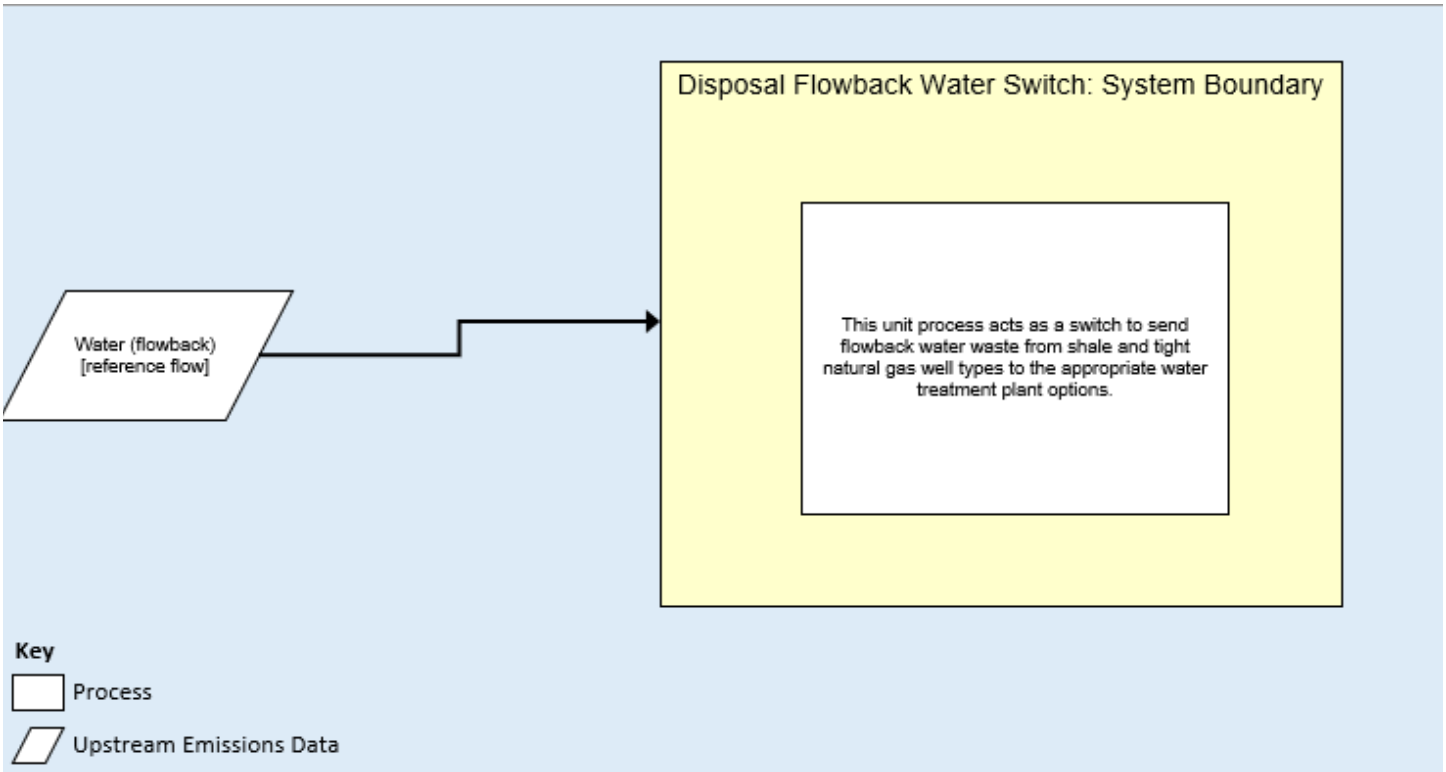

Table 1: Parameter Scenarios, Shown as Fractions

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 – 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
Appalachian – Shale	0.00	0.00	0.00	0.60	0.34	0.06
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 – Shale	0.28	0.72	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 – Tight	0.50	0.50	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 – 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
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 (Anadarko-Shale example)

Flow Name	Value	Units (Per Reference Flow)	DQI
Inputs			
Flowback [reference flow]	1	L	
Outputs			
Water (flowback, enhanced recovery) [intermediate flow]	0.43	L	2,2,3,2,1
Water (flowback, injection disposal) [intermediate flow]	0.57	L	2,2,3,2,1
Water (flowback, surface discharge) [waste]	0.00	L	2,2,3,2,1
Water (flowback, Reuse not Road) [recycle]	0.00	L	2,2,3,2,1
Water (flowback, Residual Waste Processing) [intermediate flow]	0.00	L	2,2,3,2,1
Water (flowback, 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

Date Created: December 18, 2018

Point of Contact: Timothy Skone (NETL), Timothy.Skone@NETL.DOE.GOV

Revision History:

Original/no revisions

How to Cite This Document: This document should be cited as:

NETL (2010). *NETL Life Cycle Inventory Data – Unit Process: Disposal Flowback Water Switch.* Technology Laboratory. Last Updated: December 2018 (version 01). www.netl.doe.gov/energy-analyses (http://www.netl.doe.gov/energy-analyses)

Section IV: Disclaimer

Neither the U.S. Department of Energy (DOE) National Energy Technology Laboratory (NETL) nor any person acting on behalf of these organizations:

A. Makes any warranty or representation, express or implied, with respect to the accuracy, completeness, or usefulness of the information contained in this document, or that the use of any information, apparatus, method, or process disclosed in this document may not infringe on privately owned rights; or

B. Assumes any liability with this report as to its use, or damages resulting from the use of any information, apparatus, method, or process disclosed in this document.

Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise, does not necessarily constitute or imply its endorsement, recommendation, or favoring by NETL. The views and opinions of the authors expressed herein do not necessarily state or reflect those of NETL.