

## Appendix A: Research Methods

From the PHMSA website, we downloaded the Excel files “Hazardous Liquid Accident Data - January 2010 to present (ZIP)” and “Hazardous Liquid Accident Data - January 2002 to December 2009 (ZIP)” [[link to both datasets](#)] on 2/26/18. Full analysis conducted using pandas in a jupyter notebook, available upon request.

The 2010-present dataset contained 3212 records, of which 49 represented biofuels or CO2 spills, and were excluded. The remaining 3163 records were comprised of 1605 crude oil spills, 1063 refined petroleum product spills, and 495 HVL spills. The 2002-2009 dataset contained 3030 records, from which we excluded biofuels and CO2 spills, and any records where the ‘SPILLED’ field was ‘NO.’ Of the remaining 2962 records, 1360 were crude oil spills, 1172 were refined petroleum products spills, and 419 were HVL spills.

Using the PHMSA operator database [[link](#)] and the incidents databases, we identified 41 subsidiaries or joint ventures that were associated with ETP/Sunoco. These entities were identified by:

- Searching the incident file for reports submitted via email from the domains energytransfer.com, sunocologistics.com, and sunocoinc.com.
- Searching the operator database for operators containing the phrases “transfer”, “ETP”, “ETC”, “ETE”, “sunoco”, “DAPL”, “Dakota Access”, etc.
- Cross-referencing lists of subsidiaries found in Form 10-K Ex 21.1 documents against the operator database. Lists of subsidiaries are available from the latest 10-K submissions for [ETP](#), [ETE](#), and [Sunoco Logistics Partners](#).

Although ETP and Sunoco merged in 2012, we include all spills in the database starting in 2010 for both of those entities and subsidiaries that existed at that time. For other subsidiaries acquired after 2012, we only include spills that occurred after the acquisition.

The full list of hazardous liquid subsidiaries included in this analysis is as follows:

- **ENERGY TRANSFER COMPANY** [Operator ID 32099, [link](#) to PHMSA operator page, **23 incidents**] This exact name isn’t a listed subsidiary but it does refer to the ETP/ETE family of companies. All records were submitted from energytransfer.com emails, all after June 2012. No records for this operator ID were found in the 2002-2009 data. This operator ID also has 16 incidents in PHMSA’s 2002-present natural gas gathering/transmission database, all submitted from energytransfer.com emails.
- **DAPL-ETCO OPERATIONS MANAGEMENT, LLC** [Operator ID 39205, no PHMSA operator page, **7 incidents**] This entity is listed on Form 10-K as a subsidiary of Energy Transfer Partners, L.P. Collectively DAPL and ETCO make up the Bakken Pipeline. The project is a [joint venture](#) with MarEn Bakken Company LLC (Enbridge) and Phillips 66, with ETP holding a 38.25% interest. All spill records are from 2017. Submitted via energytransfer.com emails, except the first record submitted from sunocologistics.com. No records for this operator ID were found in the 2002-2009 data. This operator ID and company name appear in the incident database, but do not appear in the operator database.
- **SUNOCO PIPELINE L.P.** [Operator IDs 18718 and 31623, [link](#) to PHMSA operator page, **337 incidents**] This entity is listed on Form 10-K as a subsidiary of Sunoco Logistics Partners L.P., with more information at links [here](#) and [here](#). In the 2002-2009 data we find 136 incidents under this operator ID plus an additional six from 2002-03 with similar names under ID 31623. (We exclude one record with SPILLED=NO). Date ranges for the two IDs overlap, and some early records were submitted from sunoil.com emails. ID 31623 does not appear in 2010-present data, but we find 195 records under ID 18718 in that data for a total of 337.
- **MID - VALLEY PIPELINE CO** [Operator IDs 12470, 12471, 30871, [link](#) to PHMSA operator page, **76 incidents**] This entity is listed on Form 10-K as a subsidiary of Sunoco Logistics Partners L.P. which has a [“controlling financial interest.”](#) Sunoco’s interest in this pipeline has been 55.3% since at least the 2002 10-K, therefore we include all incidents in our analysis. In 2002-2009 data, we find 37 incidents under this ID, plus an additional 7 incidents dating from 2002-03 under two other IDs with similar names. The other IDs do not appear in the 2010-present data, but we do find 32 records under ID 12470 in that data for a total of 76. All records submitted via sunocologistics.com emails.
- **WEST TEXAS GULF PIPELINE CO** [Operator ID 22442, [link](#) to PHMSA operator page, **46 incidents**] This entity is listed on Form 10-K as a subsidiary of Sunoco Logistics Partners L.P. which [obtained 100% interest in the pipeline in 2015](#). As of 2006, the interest in the pipeline was 43.8%, therefore we include these incidents, which are all 2006 or later, in our analysis. In the 2002-2009 data, we find 13 incidents under this ID, while in the 2010-present data we find 33 incidents, all from sunocologistics.com emails. (We exclude one record with SPILLED=NO).
- **INLAND CORPORATION** [Operator ID 32683, [link](#) to PHMSA operator page, **7 incidents**] This entity is listed on Form 10-K as a subsidiary of Sunoco Logistics Partners L.P. which acquired a [“controlling](#)

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[interest](#)” in 2011. All spills in the database for this ID post-date this acquisition. No records for this operator ID were found in the 2002-2009 data.

- **PERMIAN EXPRESS TERMINAL LLC** (formerly **SUNVIT PIPELINE LLC**) [Operator ID 39131, [link](#) to PHMSA operator page, **2 incidents**] This entity is listed on Form 10-K as a subsidiary of Sunoco Logistics Partners L.P. Sunoco Logistics [purchased a 50% interest](#) in the SunVit Pipeline from Vitol Group in September 2016, increasing their interest to 100% at that time. The project was renamed in December 2016. All spills in the database post-date this acquisition. No records for this operator ID were found in the 2002-2009 data.
- **SUNOCO MIDLAND GATHERING LLC** [Operator ID 39307, [link](#) to PHMSA operator page, **1 incident**] This entity is listed on Form 10-K as a subsidiary of Sunoco Logistics Partners L.P. This is the same operator ID as **VITOL MIDSTREAM, LLC** [4 records, see this [2011 announcement](#) for more information] which was [acquired by Sunoco](#) Logistics in [November 2016](#). The four spills tallied under Vitol Midstream pre-date the closing of the acquisition, were submitted from vitol.com email addresses (except one, which seems to have been submitted a year later), and are therefore excluded from our analysis. The one post-acquisition spill is retained. No records for this operator ID were found in the 2002-2009 data.
- **PERMIAN EXPRESS PARTNERS LLC** [Operator ID 39596, no PHMSA operator page, **1 incident**] Listed in 10-K as a subsidiary of Sunoco Logistics Partners L.P. This is a joint venture with ExxonMobil, announced in November 2016, where Sunoco Logistics has an [85% stake](#). The only spill post-dates the partnership. No records for this operator ID were found in the 2002-2009 data. This operator ID and company name appear in the incident database, but do not appear in the operator database.
- **SUNOCO PARTNERS MARKETING & TERMINALS LP** [Operator ID 39706, no PHMSA operator page, **3 incidents**] This entity is listed on Form 10-K as a subsidiary of Sunoco Logistics Partners L.P. All reports submitted from energytransfer.com emails, and all were in 2017. No records for this operator ID were found in the 2002-2009 data. This operator ID and company name appear in the incident database, but do not appear in the operator database.
- **WOLVERINE PIPELINE CO** [Operator ID 22830, [link](#) to PHMSA operator page, **11 incidents**] This entity is listed on Form 10-K as a subsidiary of Sunoco Logistics Partners L.P. As of 2004, Sunoco Logistics held a 31.5% interest in this [joint venture](#), the same percentage as today. In the 2002-2009 dataset, we find 7 incidents under this ID, and 4 incidents in the 2010-present data. (We exclude one record with SPILLED=NO). Since all incidents are 2004 or later we include all in our analysis.
- **HARBOR PIPELINE CO** [Operator ID 7063, [link](#) to PHMSA operator page, **6 incidents**] This entity is not listed in the latest 10-K as a subsidiary, however it does appear on [this website](#) as an asset of Sunoco Logistics Partners. The spill records in the database are from 2004-2012, were submitted from sunocologistics.com emails, and the Harbor Pipeline is mentioned in the 2004 10-K. In the 2002-2009 data, we find 3 incidents under this ID, one of which has the Sunoco Pipeline L.P name, submitted via sunocologistics.com emails.
- **SUNOCO, INC (R&M)** [Operator IDs 18779 and 31676, [link](#) to PHMSA operator page, **6 incidents**] Sunoco, Inc is the name of the pre-merger entity that was acquired by ETP. In the 2010-present data we find two spills date from 2010 and were submitted via sunocoinc.com emails. In 2002-2009 data, we find 2 incidents under ID 18779 plus 2 more under ID 31676. The names vary somewhat, but we cluster them here. (We exclude one record with SPILLED=NO)
- **WYNNEWOOD REFINERY COMPANY** [Operator ID 32096, [link](#) to PHMSA operator page, **1 incident**] This ID does not appear in the 2010-present data, but shows one incident in 2009 submitted from a sunocologistics.com email. The 2011 10-K notes that Sunoco Logistics acquired 100% interest in Excel in September 2009, which included a pipeline and a refinery in Wynnewood, OK. This incident is from July 2009, but [the 10-K notes](#) that Sunoco was “the operator of the pipeline prior to the acquisition” and so we include this incident.

The following hazardous liquids entities are excluded from this analysis:

- **EXPLORER PIPELINE CO** [Operator ID 4805, [link](#) to PHMSA operator page, **49 incidents**] This entity is listed on Form 10-K as a subsidiary of Sunoco Logistics Partners L.P. This is a [JV](#) with Phillips 66, Marathon, and Shell, operated by Explorer. Sunoco Logistics holds a 15% stake. We exclude joint ventures where ETP/Sunoco has less than a 25% stake and is not the pipeline operator.
- **WEST SHORE PIPELINE CO** [Operator ID 22430, [link](#) to PHMSA operator page, **16 incidents**] This entity is listed on Form 10-K as a subsidiary of Sunoco Logistics Partners L.P. Sunoco Logistics holds a 17.1% stake in this [JV](#), which is operated by Buckeye Partners. We exclude joint ventures where ETP/Sunoco has less than a 25% stake and is not the pipeline operator.
- **LONE STAR NGL REFINERY SERVICES LLC** [Operator ID 31673, [link](#) to PHMSA operator page, **2 incidents**] This entity is listed on Form 10-K as a subsidiary of Energy Transfer Partners L.P. This operator ID is inactive. In [2011 ETP purchased](#) LDH Energy Asset Holdings LLC. In the 2002-2009 data, two records are found for this ID under the name **LOUIS DREYFUS OLEFINS, LLC**. The records are

submitted from louisdreyfus.com and ldhenergy.com emails. We exclude these 2006 incidents because they pre-date the acquisition. One additional spill record in the 2010-present data was submitted by an energytransfer.com email address for **LDH ENERGY PIPELINE L.P.** [Operator ID 32035, [link](#) to PHMSA operator page, **10 incidents**], which is likely the result of the same merger. Possibly the event was noticed and reported by an ETP contractor or possibly it was reported by ETP post-merger, but we do not include it in this assessment since it occurred in 2010 and pre-dates the merger.

- **REGENCY FIELD SERVICES LLC** [Operator ID 31852, [link](#) to PHMSA operator page, **1 incident**] This exact name does not appear in the most recent 10-K, but ETP seems to have [acquired Regency Energy Partners in 2010](#) and then [merged in 2015](#). This opid does not appear in the 2010-present data and is currently inactive, but 2002-09 data shows one incident HVL/liquid natural gas incident in 2007, submitted from a regencygas.com email. However, this incident pre-dates the acquisition and so is excluded.

The following are hazardous liquid subsidiaries that have a PHMSA operator ID, but did not record any incidents from 2010-present:

- **BAYOU BRIDGE PIPELINE, LLC** [Operator ID 39462, [link](#) to PHMSA operator page, 0 incidents] This entity is listed on Form 10-K as a subsidiary of Sunoco Logistics Partners L.P. This is a joint venture in which both ETP and Sunoco Logistics hold a 30% stake.
- **PHILADELPHIA ENERGY SOLUTIONS REFINING AND MARKETING, LLC** [Operator ID 38964, [link](#) to PHMSA operator page, 0 incidents] This entity is listed on Form 10-K as a subsidiary of Energy Transfer Partners L.P.
- **LIBERTY PIPELINE GROUP, LLC** [Operator ID 32582, [link](#) to PHMSA operator page, 0 incidents] This entity is listed on Form 10-K as a subsidiary of Energy Transfer Partners L.P. This operator ID is inactive.
- **REGENCY LIQUIDS PIPELINE LLC** [Operator ID 32355, [link](#) to PHMSA operator page, 0 incidents] This entity is listed on Form 10-K as a subsidiary of Energy Transfer Partners L.P. This operator ID is inactive.

The following are natural gas subsidiaries with PHMSA operator IDs that reported incidents from natural gas transmission pipelines:

- **ENERGY TRANSFER COMPANY** [Operator ID 32099, [link](#) to PHMSA operator page, **16 incidents**] This operator ID has 10 incidents in the 2010-present data, and 6 incidents in the 2002-2009 data, all submitted from energytransfer.com emails.
- **PANHANDLE EASTERN PIPELINE CO** [Operator ID 15105, [link](#) to PHMSA operator page, **11 incidents**] 11 incidents were found in the 2010-present dataset, all from energytransfer.com emails.
- **FLORIDA GAS TRANSMISSION CO** [Operator ID 5304, [link](#) to PHMSA operator page, **11 incidents**] 11 incidents were found in the 2010-present dataset, all from energytransfer.com emails.
- **SEA ROBIN PIPELINE CO** [Operator ID 18152, [link](#) to PHMSA operator page, **9 incidents**] 9 incidents were found in the 2010-present dataset, all from energytransfer.com emails.
- **TRUNKLINE GAS CO** [Operator ID 19730, [link](#) to PHMSA operator page, **5 incidents**] 4 incidents were found in the 2010-present dataset, and one incident was found in the 2002-2009 dataset, all submitted from energytransfer.com emails.
- **TRANSWESTERN PIPELINE COMPANY LLC** [Operator ID 19610, [link](#) to PHMSA operator page, **4 incidents**] 3 incidents were found in the 2010-present dataset, and one incident was found in the 2002-2009 dataset, all submitted from energytransfer.com emails.
- **REGENCY INTRASTATE GAS LP** [Operator ID 32335, [link](#) to PHMSA operator page, **1 incident**] 1 incident was found in the 2010-present dataset, submitted from an energytransfer.com email. Currently inactive ID.
- **HOUSTON PIPELINE CO** [Operator ID 7605, no PHMSA operator page, **1 incident**] 1 incident from 2003 was found in the 2002-2009 dataset, submitted from an energytransfer.com email. This operator ID and company name appear in the incident database, but do not appear in the operator database.

The following are natural gas operator IDs that are listed as ETP or Sunoco subsidiaries, but did not report any incidents or are otherwise excluded from the analysis:

- **MIDCONTINENT EXPRESS PIPELINE LLC** [Operator ID 32436, [link](#) to PHMSA operator page, **1 incident**] This entity is listed as a subsidiary on the latest 10-K, but the incident dates to 2009 and was submitted from a kindermorgan.com email, and so is excluded.
- **ETC TIGER PIPELINE, LLC** [Operator ID 32467, [link](#) to PHMSA operator page, 0 incidents] See this [link](#) for more information.

- **PENNTEX MIDSTREAM PARTNERS, LLC** [Operator ID 39173, [link](#) to PHMSA operator page, 0 incidents] Inactive operator ID. This ID reports both natural gas and hazardous liquids mileage, but no incidents.
- **SOUTHERN UNION GAS SERVICES, LTD** [Operator ID 18526, [link](#) to PHMSA operator page, 0 incidents] Inactive operator ID. This ID reports both natural gas and hazardous liquids mileage, but no incidents.
- **CHALKEY TRANSMISSION COMPANY, LTD** [Operator ID 31211, [link](#) to PHMSA operator page, 0 incidents] Inactive operator ID.
- **FAYETTEVILLE EXPRESS PIPELINE, LLC** [Operator ID 32469, [link](#) to PHMSA operator page, 0 incidents]
- **GULF STATES TRANSMISSION CORPORATION** [Operator ID 32323, [link](#) to PHMSA operator page, 0 incidents]
- **LEE 8 STORAGE PARTNERSHIP** [Operator ID 30786, [link](#) to PHMSA operator page]
- **LOBO PIPELINE LP** [Operator ID 31735, [link](#) to PHMSA operator page, 0 incidents] Inactive operator ID.
- **PEI POWER CORP** [Operator ID 31453, [link](#) to PHMSA operator page, 0 incidents] Inactive operator ID.
- **PENNTEX PERMIAN, LLC** [Operator ID 39432, [link](#) to PHMSA operator page, 0 incidents] Inactive operator ID.
- **SOUTHERN UNION INTRASTATE GAS PIPELINE** [Operator ID 32256, [link](#) to PHMSA operator page, 0 incidents] Inactive operator ID.
- **WGP-KHC, LLC** [Operator ID 31730, [link](#) to PHMSA operator page, 0 incidents]

No incidents from ETP or its subsidiaries were found in PHMSA natural gas distribution incident data.

### Mapping the Data

An interactive map of the ETP/Sunoco spill dataset was created in carto. The 2010-present PHMSA data is standardized with latitude and longitude expressed in decimal degrees. However, the 2002-2009 PHMSA data does not have a standard format for lon-lat data, particularly for the early years. Latitude and longitude were presented in a variety of formats, including D.d, DM.m and DMS. We converted all of these values to the standard D.d format. For a number of incidents, we changed the reported longitude from positive to negative values, under the assumption that the spills occurred in the western hemisphere. For 7 spills, no latitude-longitude was reported, and for 3 more spills, the data was reported in unknown formats. These 10 incidents are not shown on the map.

For comparison purposes, we display U.S. liquids pipelines using shapefiles compiled by the U.S. Energy Information Agency (EIA) [[link](#)], plus one shapefile of the Dakota Access Pipeline obtained from public sources. Where EIA identified ETP, Sunoco or one of their corporate entities as the pipeline operator we colored the pipeline red; all other pipelines are colored grey. The shapefiles used were 'Crude Oil Pipelines', 'Petroleum Product Pipelines' and 'HGL (hydrocarbon gas liquids) Pipelines.' EIA describes these files as being based on "publicly available data from a variety of sources with varying scales and levels of accuracy." This EIA pipeline dataset is likely not a complete set of U.S. liquids pipelines and may not fully reflect ETP/Sunoco's current or past pipeline assets.