STARK COUNTY

2018 Commodity Flow Study

STARK COUNTY
COMMODITY FLOW STUDY

RELEASED 2018

STARK COUNTY COMMODITY FLOW STUDY

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COMMODITY FLOW STUDY

1.0 INTRODUCTION

1.1 Purpose of Study

Congress passed the Emergency Planning and Community Right-to-Know Act (EPCRA), also known as Title III of the Superfund Amendment and Reauthorization Act (SARA), in 1986, which provides for the collection and availability of information regarding the use, storage, production, and release of hazardous chemicals to the public and emergency responders in local communities. Community right-to-know provisions provide education, information, and public access regarding chemical uses and releases into the environment respective to individual facilities. By doing so, states and communities, working with facilities, can improve chemical safety and protect public health and the environment.

In 1988, Ohio passed Senate Bill 367 Chapter 3750 that implemented the Ohio State Emergency Response Commission (SERC) to act as the governing body over the Emergency Planning and Community Right-To-Know Act (EPCRA). The SERC consists of nine different state agencies that work with local emergency planning committees (LEPC) to represent each county/district for the state of Ohio except for Montgomery and Greene counties that combine to have one LEPC. The EPCRA is indicative of the fact that Congress realizes the risk to communities posed by the use, storage, and transportation of hazardous materials. Ohio's implementation of the EPCRA indicates the state's realization of this risk as well.

As part of the implementation of the EPCRA, LEPCs should develop and implement comprehensive emergency response plans. As part of the process of developing these plans, LEPCs conduct various hazard analyses and risk assessments, of which this commodity flow study is an example.

Utilizing funding from the Public Utilities Commission of Ohio (PUCO), the Stark County Local Emergency Planning Committee (LEPC) coordinated the completion of this flow study. The LEPC hired a contractor, JH Consulting, LLC of West Virginia (JHC) of Buckhannon, West Virginia to facilitate data collection

and analysis. The project proceeded throughout Calendar Year 2018. Following the collection of data, JHC completed the final analysis and assimilated the results into a report. (NOTE: The sections below provide detailed methodologies by analysis.)

This study intends to provide emergency managers and responders in the county with information to more fully advise efforts to mitigate, prepare for, respond to, and recover from hazardous material incidents. These efforts may significantly minimize damage or harm to equipment, facilities, personnel, and to the community at large.

1.2 Description of the Planning Area

Stark County was established on January 1, 1809. It is in northeastern Ohio and has an estimated population of 375,586 (US Bureau of the Census, 2010). Stark County consists of 581 square miles of land area and 5.3 square miles of water. On average, Stark County experiences 39.58 inches of rainfall and 48 inches of snowfall annually (www.usclimatedata.com).

Stark County contains six cities: Alliance, Canal Fulton, Canton (which acts as county seat), Louisville, Massillon, and North Canton. Villages include Beach City, Brewster, East Canton, East Sparta, Hartville, Hills and Dales, Limaville, Magnolia, Minerva, Meyers Lake, Navarre, Waynesburg, and Wilmot. The county also contains several townships, including Bethlehem, Canton, Jackson, Lake, Lawrence, Lexington, Marlboro, Nimishillen, Osnaburg, Paris, Perry, Pike, Plain, Sandy, Sugar Creek, Tuscarawas, and Washington. Carroll, Columbiana, Holmes, Mahoning, Portage, Summit, Tuscarawas, and Wayne Counties border Stark County.

Several transportation routes traverse the area, including US Routes 30, 62, 250, and 621 and State Routes 21, 42, 44, 93, 172, 183, 212, 236, 241, 225, 619, 627, 800. Central Stark County also contains a large portion of Interstate 77, which passes through Canton near its downtown area. Railway transportation is also present in Stark County, with the following companies servicing clients in the area: CSX Transportation, Ohio Central Railroad, Inc., R.J. Corman Railroad Company/Cleveland Lines, LLC, and Wheeling & Lake Erie. Stark County contains pipelines for Columbia Gas Transmission, LLC., Dominion Energy Ohio, Ergon Terminaling, Inc., WMRE of Ohio-American, LLC., Marathon Pipeline,

LLC, and Inland Corporation.

Figure 1.2.a

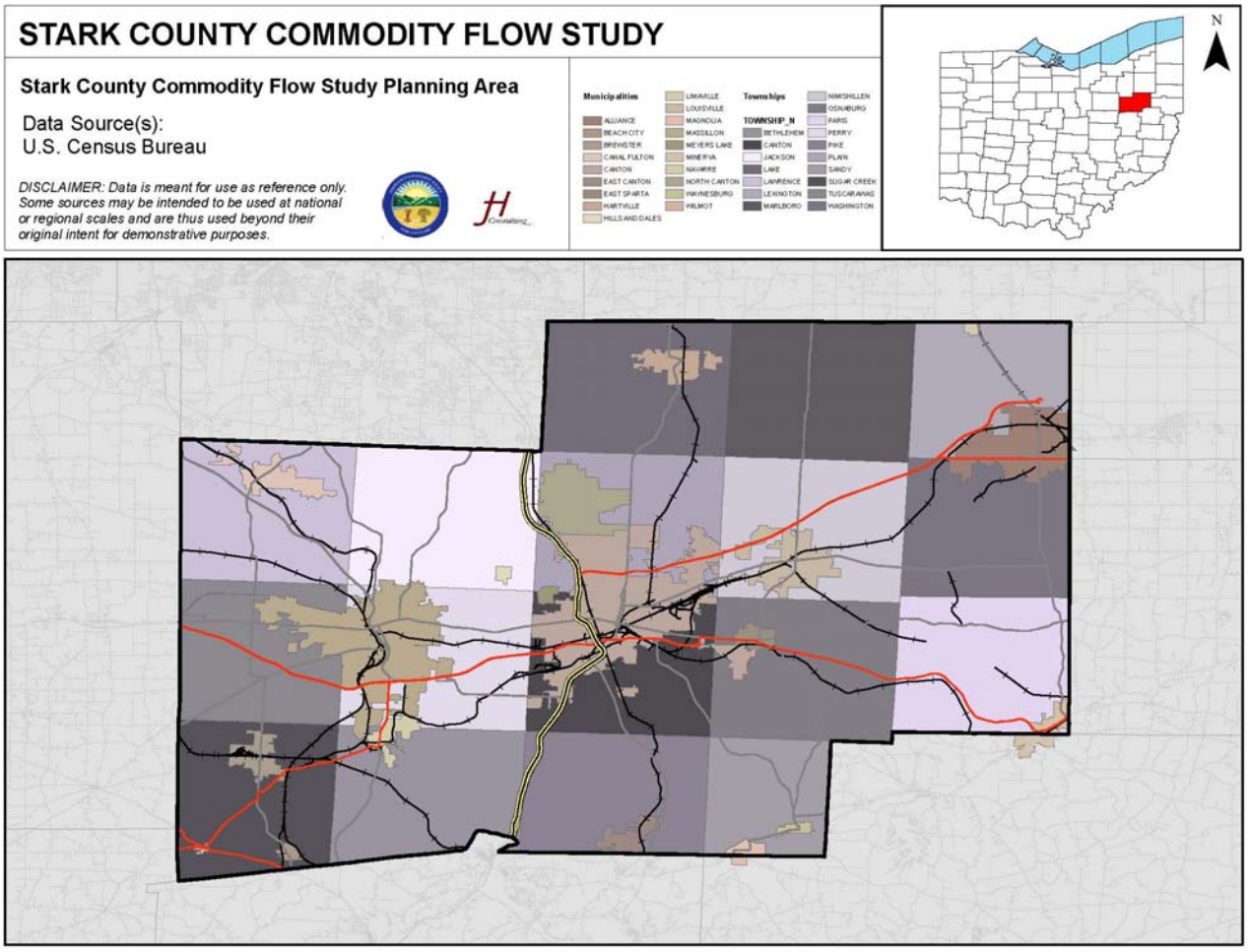


Figure 1.2.b

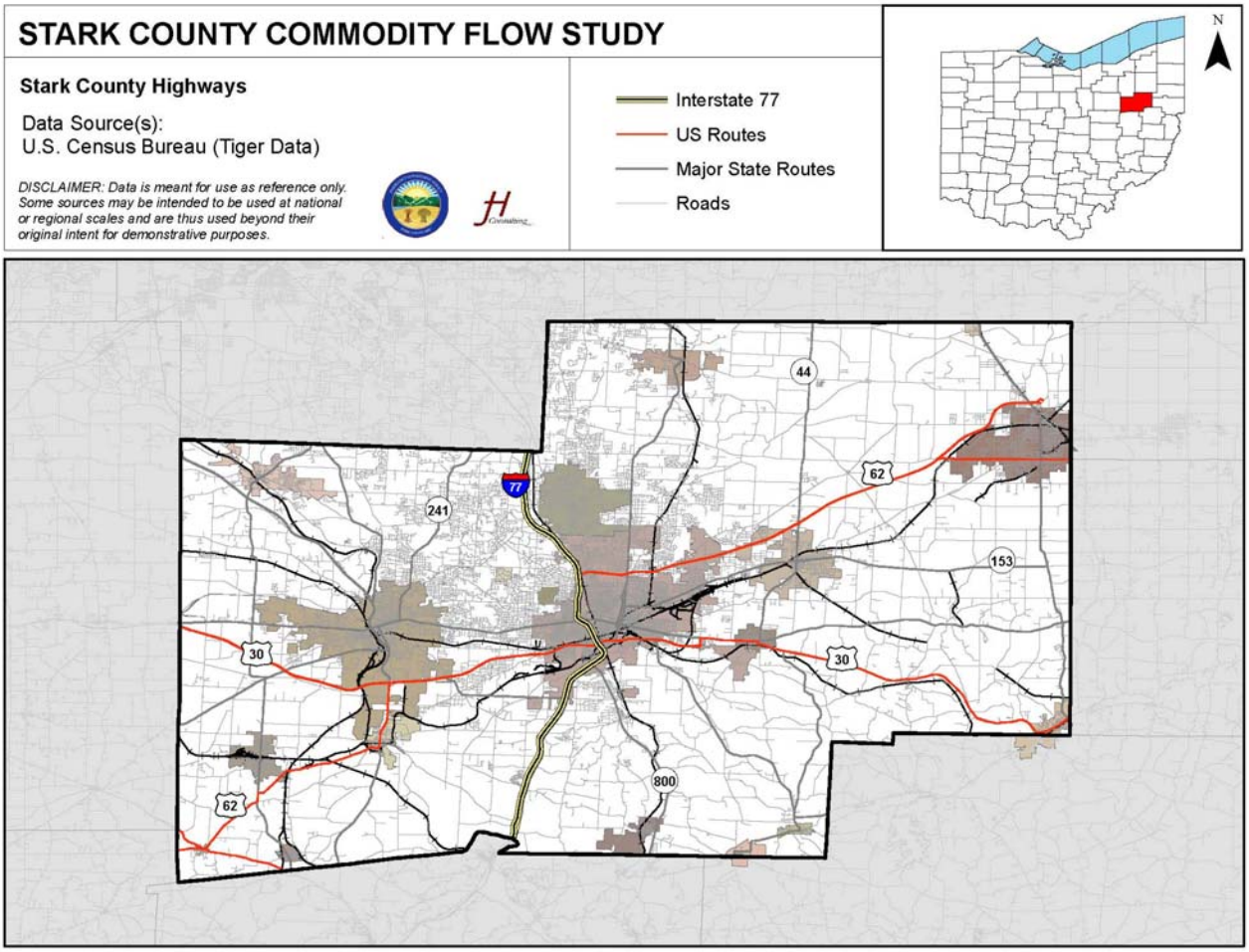
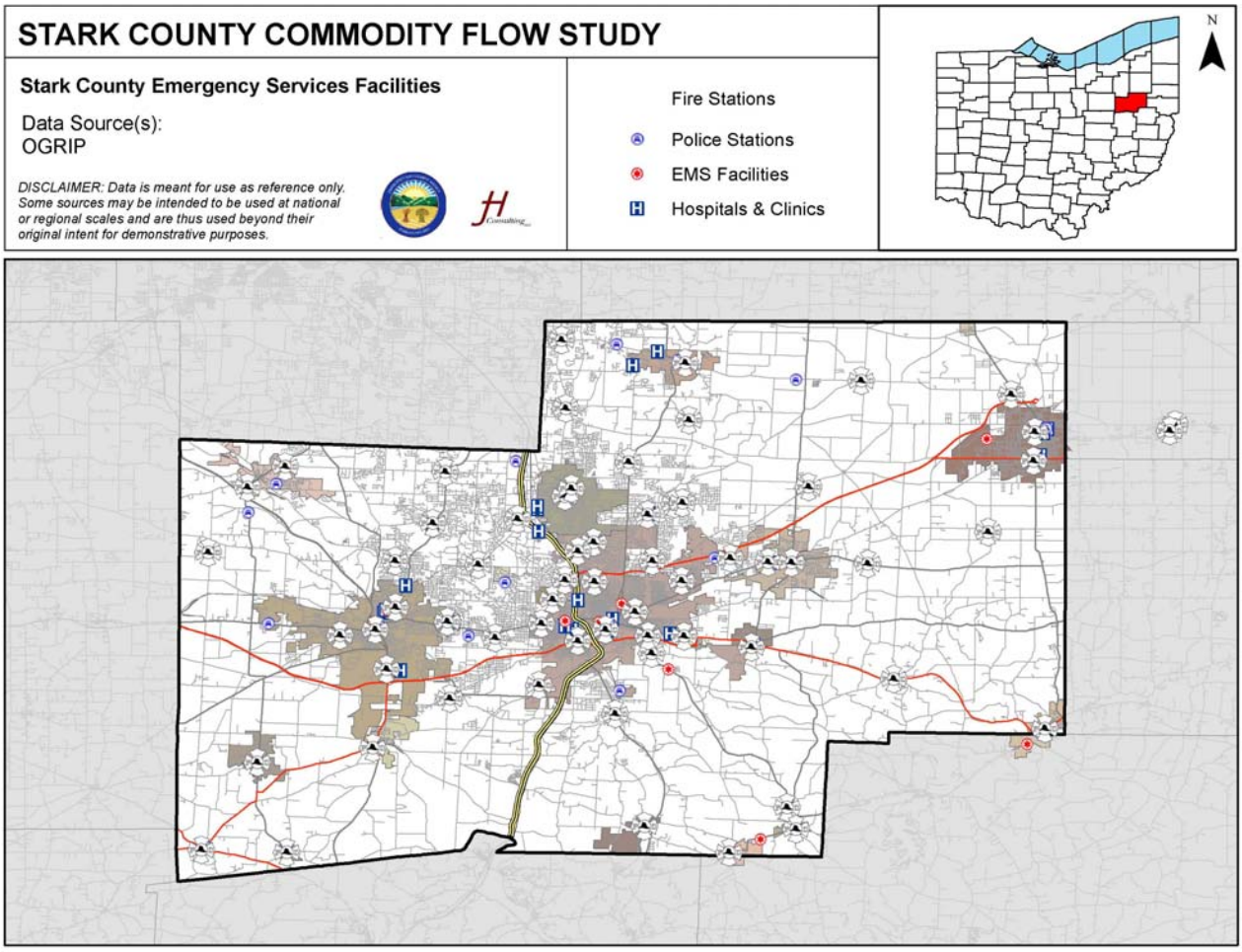

STARK COUNTY COMMODITY FLOW STUDY
Stark County Highways
Data Source(s):
U.S. Census Bureau (Tiger Data)
DISCLAIMER: Data is meant for use as reference only. Some sources may be intended to be used at national or regional scales and are thus used beyond their original intent for demonstrative purposes.
Interstate 77
US Routes
Major State Routes
Roads
N
44
62
241
77
153
30
30
800
62

Figure 1.2.c


STARK COUNTY COMMODITY FLOW STUDY
Stark County Emergency Services Facilities
Data Source(s):
OGRIP
DISCLAIMER: Data is meant for use as reference only. Some sources may be intended to be used at national or regional scales and are thus used beyond their original intent for demonstrative purposes.
Fire Stations
Police Stations
EMS Facilities
Hospitals & Clinics
N

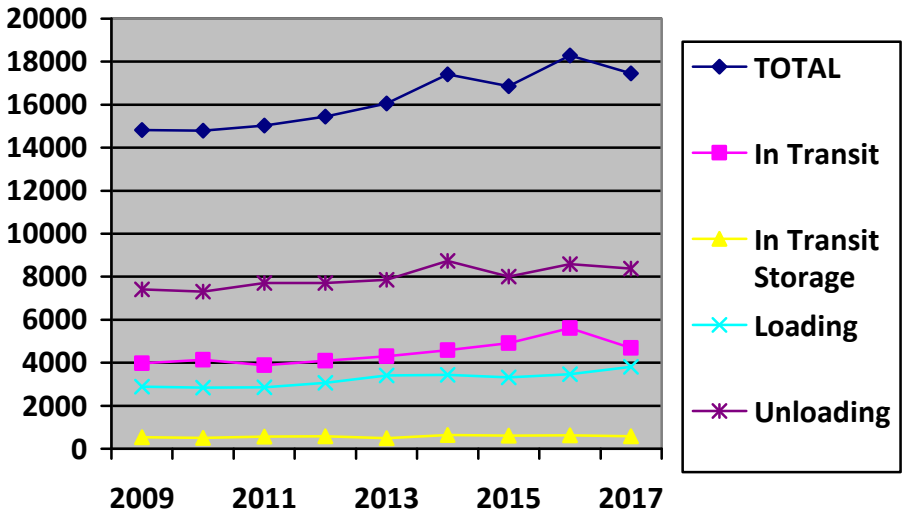
2.0 HIGHWAY ANALYSIS

2.1 Statistics

The annual number of hazardous material incidents during transport in the United States has increased since 2009, though since 2014 the number has oscillated. Figure 2.1.a shows the total hazardous material incidents in the U.S. for the period 2009-2017. The blue line with the diamond year indicators represents the total number of incidents. The sub-lines are all parts of that total, and they indicate the transport phase in which the incident occurred.

Figure 2.1.a

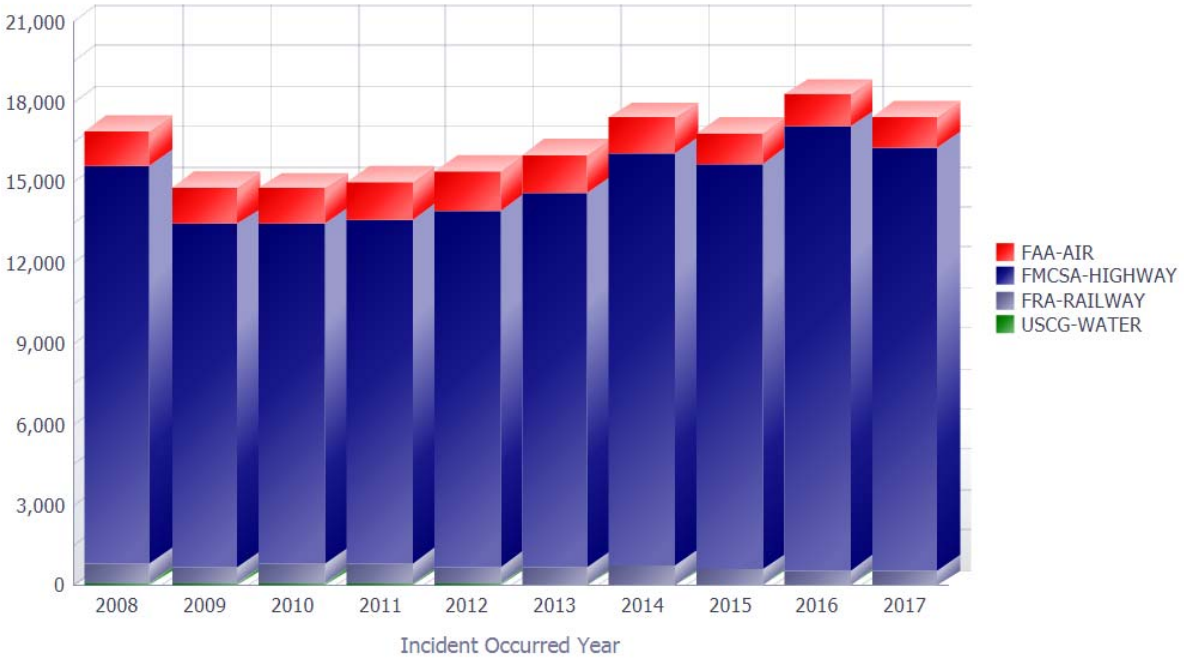
Hazardous Materials Incidents in the U.S., 2009-2017



Per Figure 2.1.b, the U.S. Department of Transportation (DOT) has posited that a majority of hazardous material incidents in the United States occur on highways (http://www.phmsa.dot.gov/hazmat/library/data-stats/incidents).

Figure 2.1.b

Hazardous Material Incidents by Mode



The DOT also maintains data on the causes of hazardous material incidents. According to the DOT, the causes of the highway incidents have been as follows (http://www.phmsa.dot.gov/hazmat/library/data-stats/incidents).

Table 2.1.1

Cause of Hazardous Materials Incidents, 2015-2017

Cause	2015	2016	2017	Total
Abrasion	66	118	95	279
Broken Component or Device	251	285	252	788
Cause Not reported	2,925	2,318	3,248	8,491
Commodity Polymerization	6	14	3	23
Commodity Self-Ignition	63	112	12	187
Conveyer or Material Handling Equipment Mishap	22	26	129	177
Corrosion – Exterior	39	37	27	103
Corrosion – Interior	1,152	1,222	41	2,415
Defective Component or Device	21	17	1,163	1,201
Derailment	208	234	12	454
Deterioration or Aging	1,592	2,007	170	3,769
Dropped	46	31	1,681	1,758
Fire, Temperature, or Heat	1,738	1,969	32	3,739
Forklift Accident	24	18	1,763	1,805

Cause	2015	2016	2017	Total
Freezing	1,425	1,406	13	2,844
Human Error	1,023	979	1,486	3,488
Impact with Sharp or Protruding Object (e.g., Nails)	1,740	1,779	870	4,389
Improper Preparation for Transportation	22	245	1,199	1,466
Inadequate Accident Damage Protection	621	919	377	1,917
Inadequate Blocking and Bracing	11	10	1,174	1,195
Inadequate Maintenance	573	945	15	1,533
Inadequate Preparation for Transportation	81	116	674	871
Inadequate Procedures	4	6	56	66
Inadequate Training	9	15	6	30
Incompatible Product	5	6	2	13
Incorrectly Sized Component or Device	2,238	2,657	12	4,907
Loose Closure, Component, or Device	66	51	2,282	2,399
Misaligned Material, Component, or Device	57	35	37	129
Missing Component or Device	79	68	44	191
Over-Pressurized	95	68	64	227
Overfilled	108	109	63	280
Rollover Accident	1	1	89	91
Threads Worn or Cross Threaded	14	15	23	52
Too Much Weigh on Package	364	328	277	969
Valve Open	231	228	139	598
Vandalism	2	1	2	5
Vehicular Crash or Accident Damage	142	115	111	368
Water Damage	10	4	11	25

There are many types of hazardous materials transported via highways, each divided into “classes” denoted on the placards labeling shipments. Table 2.1.2 lists the hazardous material classes involved in 2014, 2015, and 2016 incidents (http://www.phmsa.dot.gov/hazmat/library/data-stats/incidents).

Table 2.1.2

Hazmat Incidents by Class, 2015-2017

Hazard Class		2015	2016	2017
1:Explosives	Highway	7	2	2
	Total	16	6	6
2: Flammable, Non-Flammable, & Poisonous Gases	Highway	199	20	32
	Total	291	100	137
3: Flammable Liquids	Highway	400	645	808
	Total	439	984	1147
4: Other Ignitable Hazards	Highway	34	4	6
	Total	36	7	8
5: Oxidizers	Highway	216	42	79
	Total	218	48	85
6: Poisonous & Infectious Materials	Highway	66	27	32
	Total	123	46	71
7: Radioactive Materials	Highway	0	0	0
	Total	1	1	1
8: Corrosive	Highway	340	314	519
	Total	350	378	596
9: Other Miscellaneous Hazardous	Highway	1,210	52	68
	Total	1,373	200	225

The DOT also maintains the results of the hazardous material incidents discussed above. Table 2.1.3 presents those results (http://www.phmsa.dot.gov/hazmat/library/data-stats/incidents).

Table 2.1.3

Hazmat Incidents Results, 2015-2017

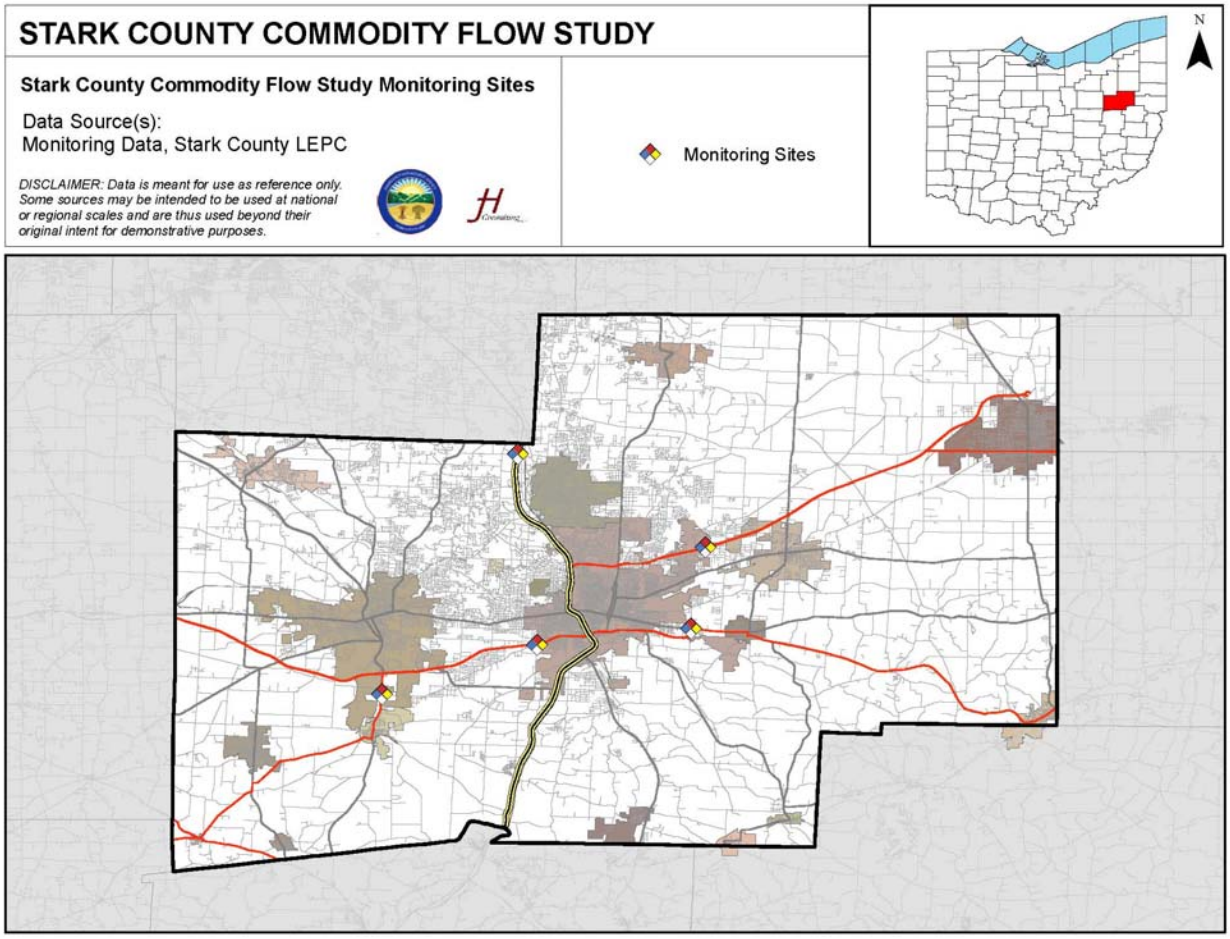
Result		2015	2016	2017
Environmental Damage	Highway	73	42	34
	Total	92	51	43
Explosion	Highway	12	15	9
	Total	14	17	12
Fire	Highway	68	58	56
	Total	88	100	96
Material Entered Waterway/Sewer	Highway	65	34	50
	Total	72	40	53
None	Highway	418	446	446
	Total	911	963	906
Spillage	Highway	14,577	15,948	15,138
	Total	15,641	16,993	16,208
Vapor (Gas) Dispersion	Highway	130	146	126
	Total	360	368	351

2.2 Methodology

To complete the highway analysis, monitors established sites along the primary transportation routes and at key intersections throughout the county. For Stark County, monitors selected the following sites. Detailed data sheets for each of these sites are in Appendix 2.

- Interstate 77
- State Route (SR) 21 (near Navarre)
- SR 172 and US Route 30 Intersection
- US Route 30 (south of Massillon)
- US Route 62 (North)
- US Route 62 (South)

Figure 2.2.a



A one-person crew staffed each observation point. This individual noted the UN numbers and the hazard classes of the placards passing through the site. The monitor manually counted the total truck traffic through the site to allow for real-time comparisons between hazmat-carrying and non-hazmat-carrying truck traffic. Planners also researched total traffic volume data (maintained by the Ohio Department of Transportation [ODOT]) for the planning area (ODOT, 2017). This data allows the planning committee to compare total traffic versus total hazmat traffic.

2.3 Field Data

Monitors counted a total of 6,957 trucks during the observation periods. Of the total trucks, 416 (5.98%) bore placards and were thus carrying hazardous materials. Monitors recorded a total of 381 trucks labeled with UN numbers

bearing a total of 45 unique UNs. Monitors also observed eight additional placards, labeled generally with the name of a DOT hazard class. General placards included the following.

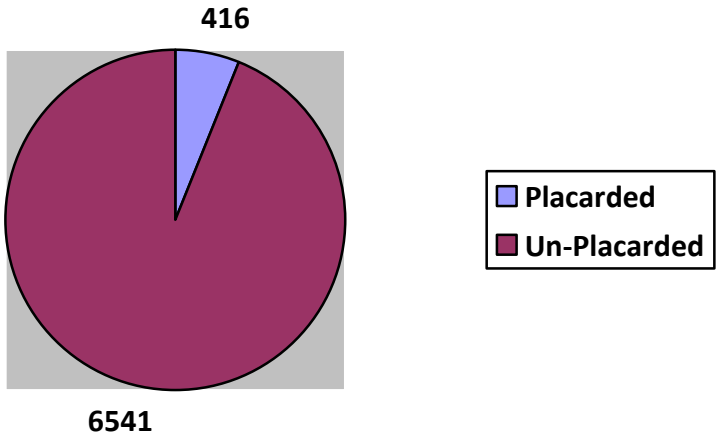
- Corrosive
- Dangerous When Wet
- Explosives
- Flammable Gas
- Flammable Liquid
- Miscellaneous
- Non-Flammable Gas
- Oxidizer

Below, planners considered trucks bearing general placards with the hazard class of the placard; thus, total figures per hazard class from this point include specifically-identified UN numbers and the general placards.

Figure 2.3.a depicts the placarded and un-placarded truck traffic observed at monitoring points.

Figure 2.3.a

Placarded vs. Un-Placarded Truck Traffic



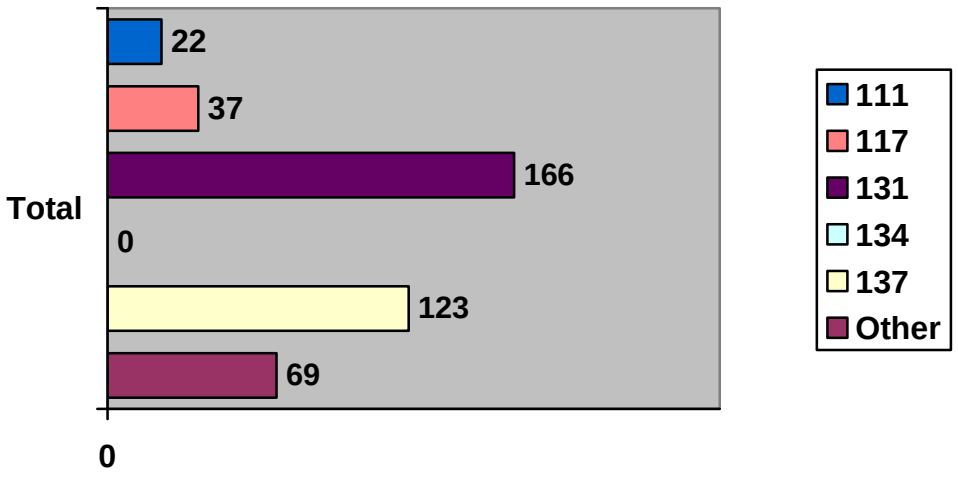
Monitors recorded placarded trucks by trailer type (e.g., mixed cargo, compressed liquefied gases, flammable liquids, etc.), per the latest edition of the U.S. DOT's *Emergency Response Guidebook* (2016, pp. 12-13). Monitors listed placarded trucks that did not fall into any of the trailer type categories (e.g., flatbed trucks) as "Other." Types 131, 137, and "Other," respectively, were the top three-observed trailers.

- **Type 131:** Non-pressure liquid tank (common commodity – gasoline)
- **Type 137:** Low-pressure chemical tank (common commodity – hydrochloric acid)
- **Other:** See above (common commodity – stake truck carrying cylinders of flammable/non-flammable gases)

See Appendix 3 for a graphic representation of each trailer type. Figure 2.3.b depicts the total placarded truck traffic counted by trailer type.

Figure 2.3.b

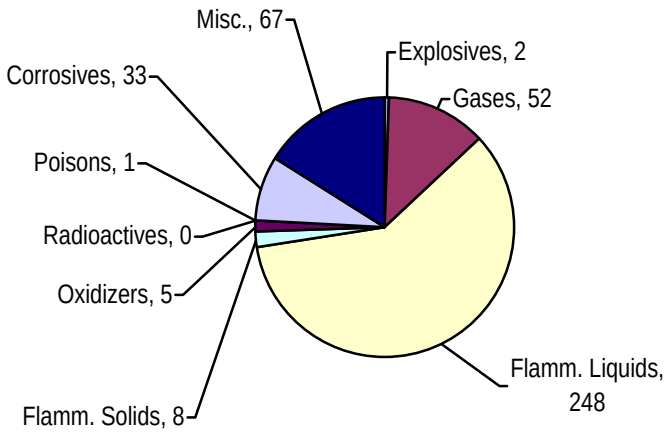
Placarded Trucks by Trailer Type



Approximately 5.98% of the 6,957 total trucks observed carried hazardous materials.

Figure 2.3.c

Placards by Hazard Class



Approximately 59.62% of the total placarded vehicles recorded were carrying Class 3 (Flammable Liquids). Class 9 (Miscellaneous Hazardous Materials) were the second-most frequently-carried materials (16.11%), followed by Class 2 (Gases, 12.50%). Within Class 3, Gasoline (UN 1203) was the most frequent material, contributing 54.44% of all Class 3 placards sighted. Flammable liquids (UN 1993) was the second-most cited material (comprising 20.97% of the Class 3 placards). Petroleum crude oil (UN 1267) comprised 9.27% of the recorded Class 3 materials. Other frequently-sighted materials included the following.

- **UN 3257 (Elevated Temperature Liquid, n.o.s., Class 9):** 51 observations for 20.56% of the total hazardous materials recorded
- **UN 1073 (Oxygen, Refrigerated Liquid, Class 2):** 12 observations for 4.84% of the total hazardous materials recorded
- **UN 1987 (Alcohols, n.o.s., Class 3):** 11 observations for 3.87% of the total hazardous materials recorded

Interestingly, three materials observed by monitors did not have a corresponding chemical name for the UN number (i.e., 1047, 1254, and 1867). According to the U.S. Department of Transportation, those UN numbers are “no

longer in use." Data indicates that UN 1867 formerly represented "self-lighting cigarettes." Monitors recorded all three UN numbers on Interstate 77, with one truck corresponding to each.

The following map (Figure 2.3.d) depicts the total hazardous material-carrying trucks observed in this study, organized by monitoring site.

Figure 2.3.d

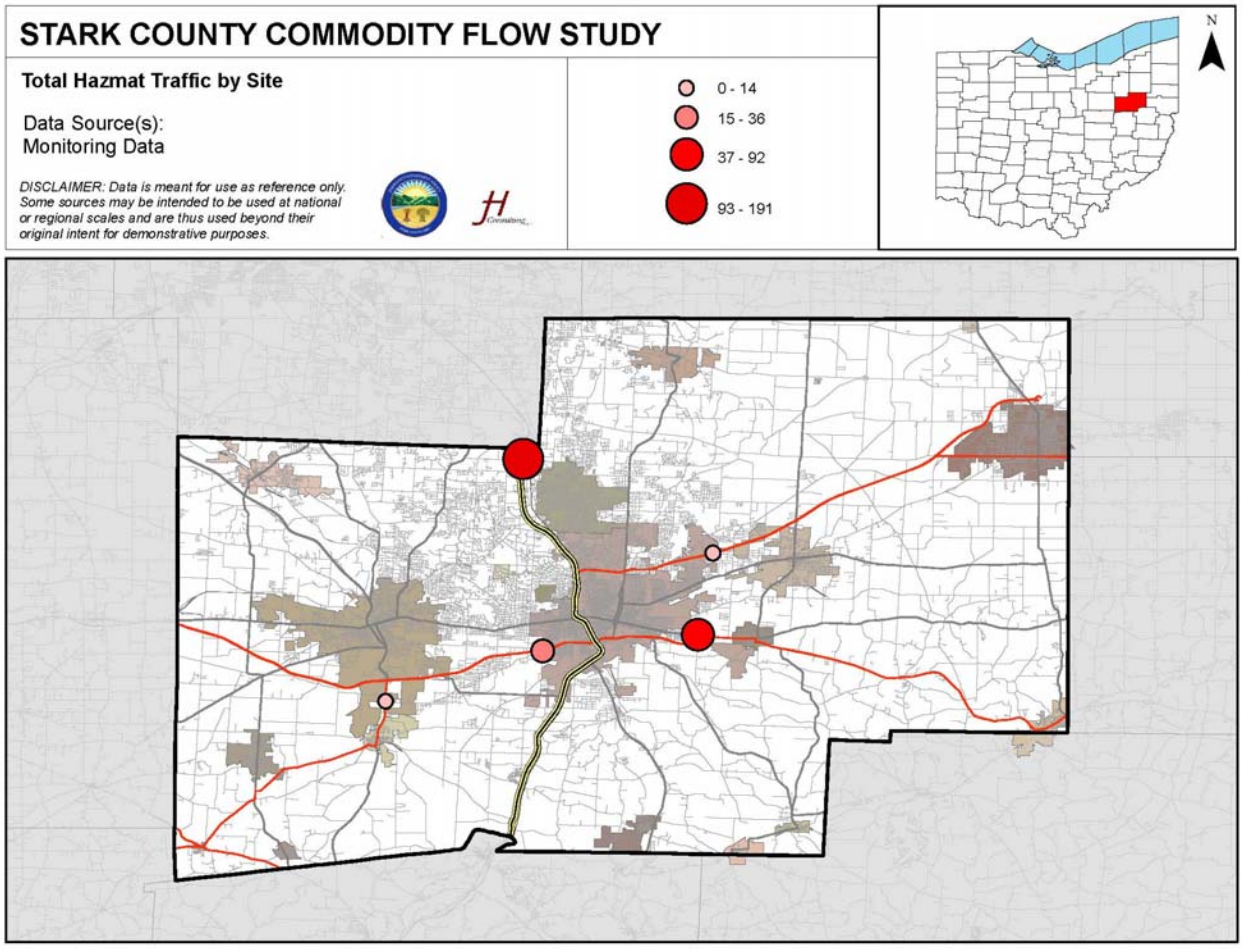


Figure 2.3.e below again presents the total hazmat-carrying trucks in the study, but organized by percent of total trucks counted at each site.

Figure 2.3.e

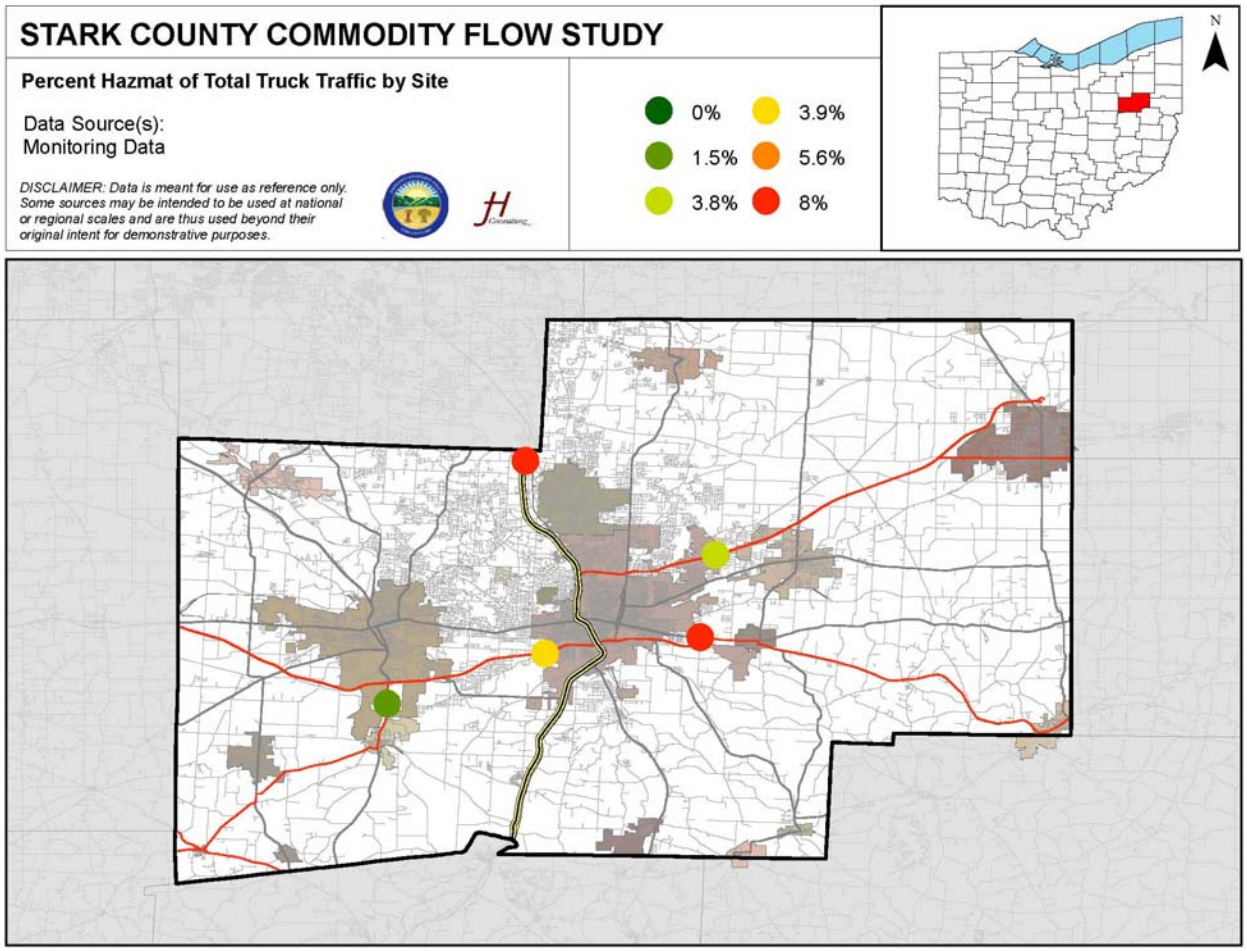
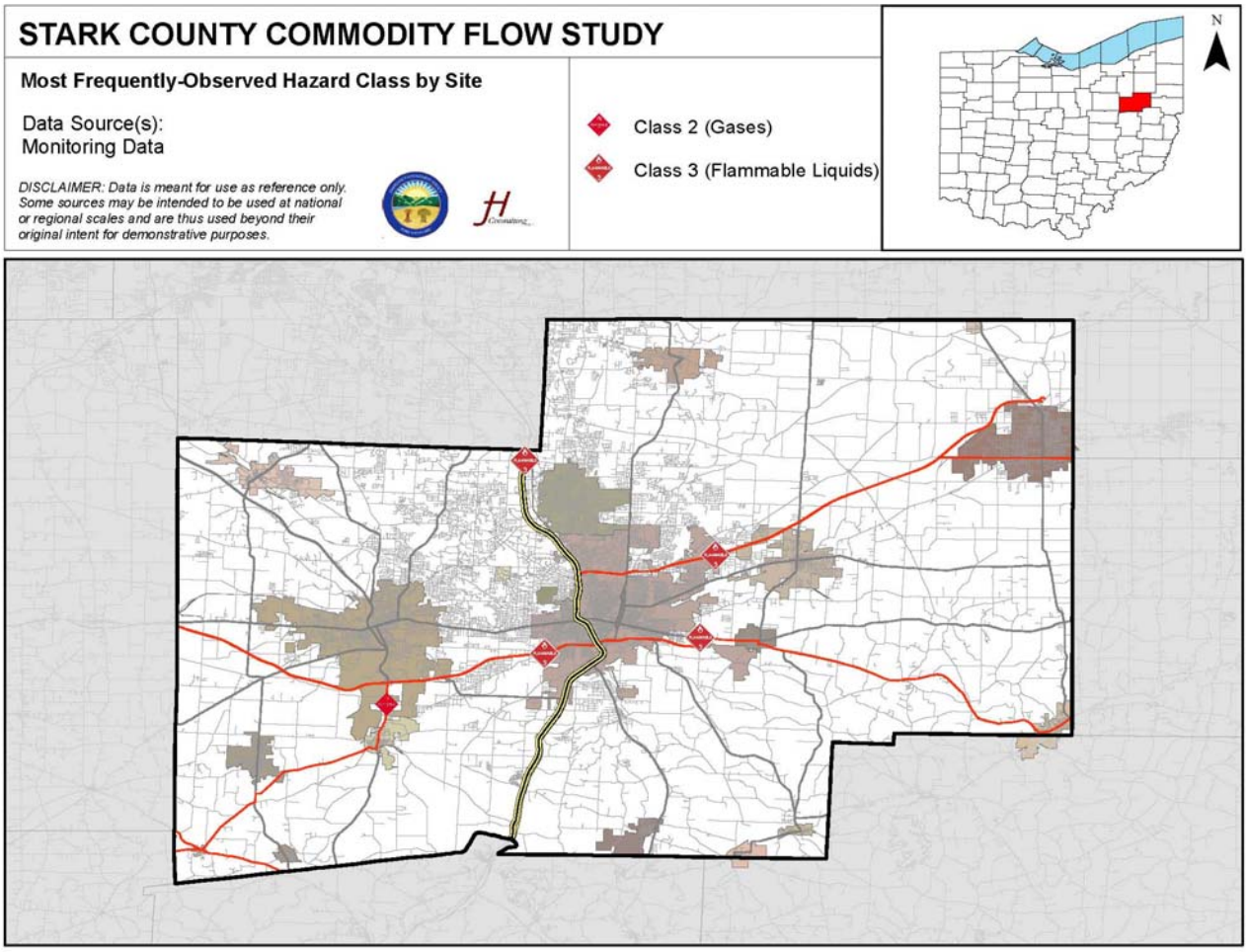


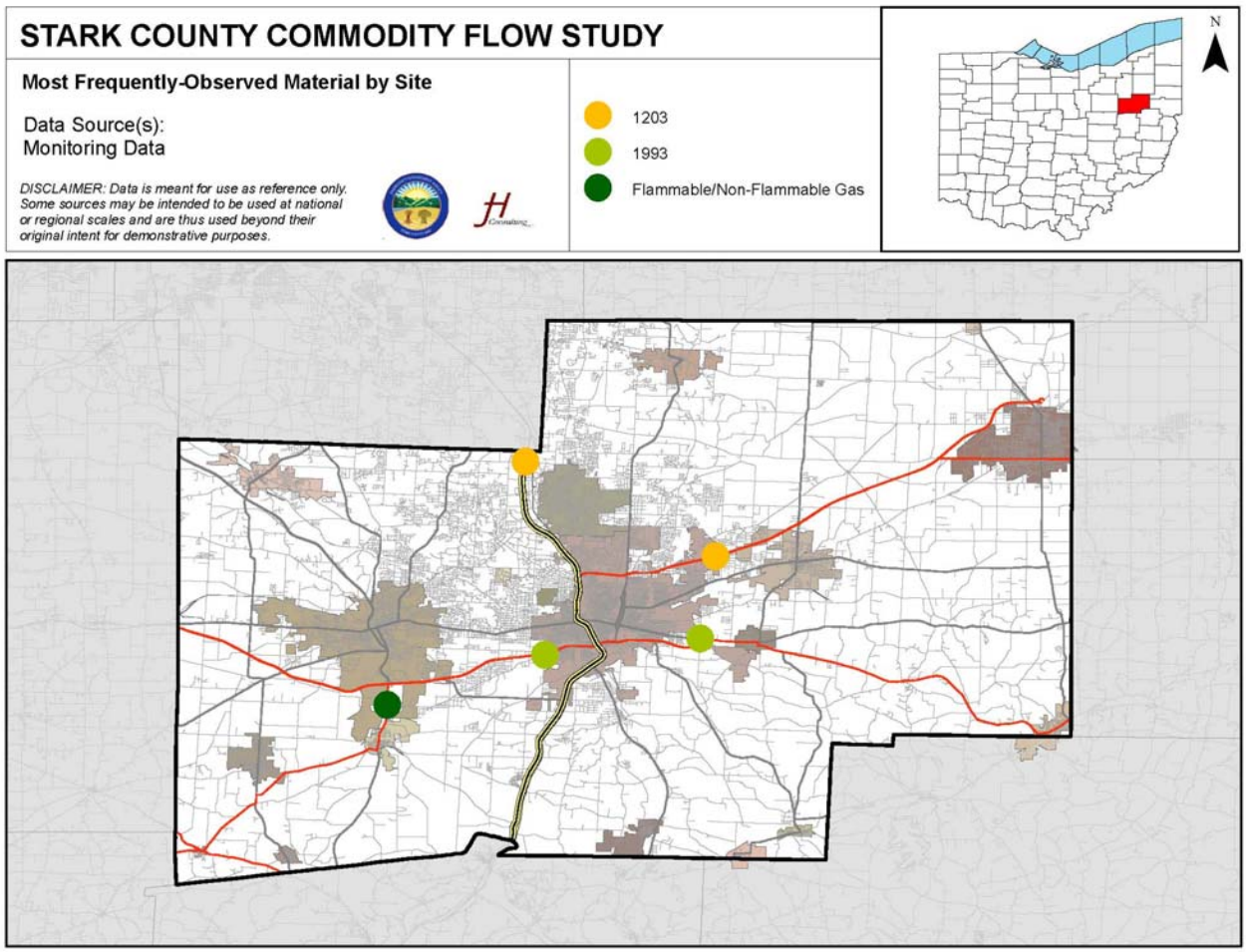
Figure 2.3.f depicts the monitoring sites; however, this graphic identifies the most frequently-recorded hazard class observed at the sites.

Figure 2.3.f



Finally, Figure 2.3.g identifies the most frequently-observed material at each monitoring site.

Figure 2.3.g



Monitors recorded two materials at the observation points that appear on the U.S. Environmental Protection Agency's (EPA) list of "extremely hazardous substances" (EHS). Table 2.3.2 and Figure 2.3.h describe these materials and their relationship to the other hazards materials recorded in this study.

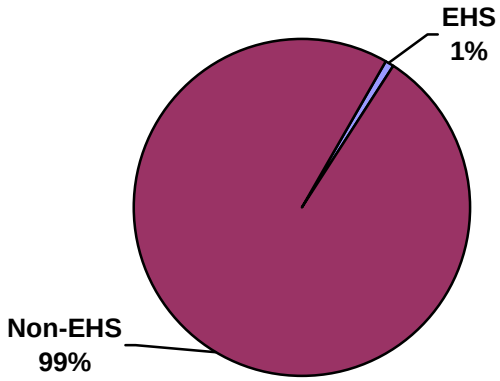
Table 2.3.1

Trucks Carrying EHS

Extremely Hazardous Substances (EHS)	Total Trucks
Benzotrichloride (UN 2226)	1
Sulfuric acid (UN 1830)	2
TOTALS	3

Figure 2.3.h

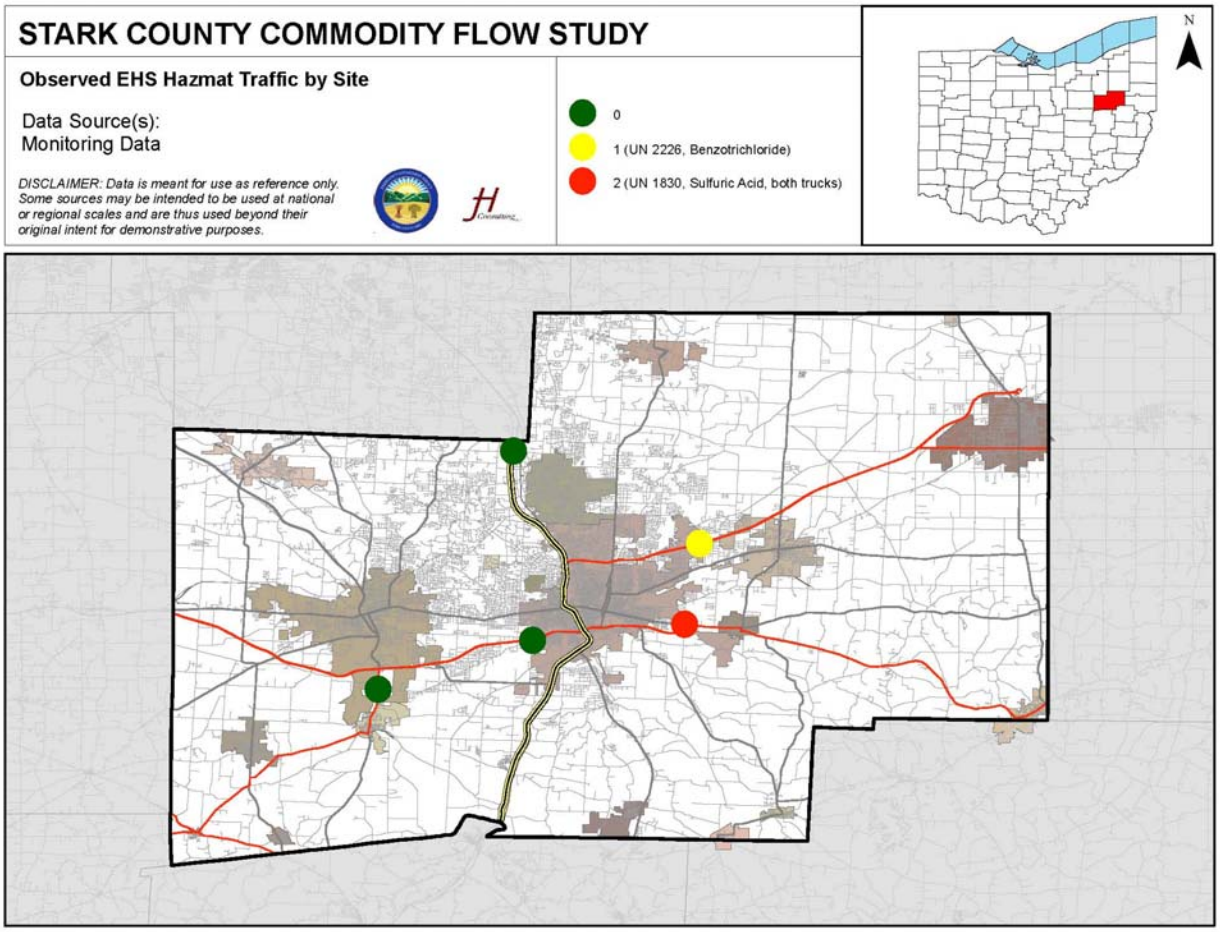
EHS vs. Total Hazmat Traffic



One truck carrying an ethylene oxide and carbon dioxide mixture (UN 1041) appeared in the highway analysis. Ethylene oxide is on the EPA's EHS list; however, carbon dioxide is not. It is unclear, based on the placard analysis, whether the concentration of ethylene oxide is high enough to make this material an extremely hazardous substance.

Figure 2.3.i shows the segments of the county to see the greatest number of EHS traffic.

Figure 2.3.i



2.4 Highway Risk Analysis

Transcaer provides a methodology to calculate the probability of a hazardous material transportation incident on highways within the boundaries of the planning area based upon several criteria, including:

- the number of placarded vehicles observed in the study area,
- the highway road miles within the study area, and
- the national hazardous material accident frequency rate.

As for a note on the risk analysis methodology, consider the following. Planners combined all monitoring sites along a given route to obtain the total placard vehicles and survey time along that route. Google Maps (2018) supplied highway miles in Stark County. The figures 1,000,000 and 0.608 were constants in the Transcaer formula. Table 2.4.1 shows the results of the highway risk

analysis. The following data is useful for planning purposes, but should always be compared with historical data.

Table 2.4.1

Highway Risk Analysis Summary

Roadway Name	Miles in Stark County	Accidents with Placarded Loads per Year
Interstate 77	13.13	1.670
State Route 21	21.42	0.179
State Route 172	29.95	1.641
US Route 30	32.69	2.288
US Route 62	39.61	1.319
AVERAGES	27.36	1.419

The Transcaer formula estimates the likely number of accidents involving "placarded loads" on the highways in the study. Figures less than one would indicate the likely instance of years passing without accidents involving placarded loads. Officials at the local level may consider mitigation measures for highways with higher estimated accidents, or they may seek to train response agencies with those routes in their first-due areas more fully on transportation-based hazardous materials emergencies.

2.5 Conclusions

Table 2.5.1 presents the top 10 materials identified by the highway analysis.

Table 2.5.1

Top 10 Materials – Highway Analysis

Material Name (and UN Number)	Total Observations	Total Sites at Which Observed
Gasoline (UN 1203)	135	All
Flammable liquids, n.o.s. (UN 1993)	52	I-77 SR 21 SR 172/US 30 US 30 US 62 (Both)
Elevated temperature liquid, n.o.s. (UN 3257)	51	I-77 SR 21 SR 172/US 30 US 30 US 62 (Both)
Petroleum crude oil (UN 1267)	23	I-77 SR 172/US 30 US 30 US 62 (Both)
Oxygen, refrigerated liquid (UN 1073)	12	I-77 SR 172/US 30 US 62 (South)
Alcohols, n.o.s. (UN 1987)	11	I-77 SR 172/US 30 US 30
TIE 7 – Nitrogen, refrigerated liquid (UN 1977)	10	I-77 US 30 US 62 (South)
TIE 7 – Petroleum distillates, n.o.s. (UN 1268)	10	I-77 SR 172/US 30
TIE 9 – Hydrocarbons, liquid, n.o.s. (UN 3295)	7	I-77 SR 172/US 30 US 62 (North)
TIE 9 – Hypochlorite solutions (UN 1791)	7	I-77 SR 172/US 30 US 30 US 62 (North)
TIE 9 – Hydrochloric acid (UN 1789)	7	I-77 SR 21 US 62 (South)

Though conclusions based on one of many analysis can be misleading, for planning purposes, highway data suggested the following.

- National hazardous material incident trends *generally* predicted the hazardous materials seen locally.
  - Confirmations
    - Class 3 (Flammable Liquids) are involved in the most incidents

nationally and were the most frequently recorded materials in the Stark County.

- Class 2 (Gases), which includes non-flammable gases ranked third nationally in incidents and were the third-most frequently-recorded materials in Stark County.

- **Deviation:** Class 8 (Corrosives) comprised the second-most incidents nationally, yet were observed fourth-most in Stark County.

- As expected, monitoring along Interstate 77 yielded the most varied data. I-77 is the route likely taken by shippers passing through Stark County.
- The location of covered facilities also influenced the types of materials noted during the highway analysis. For example, 13.9% of the placards at the US Route 62 (South) site, near the Marathon facility, were petroleum crude oil.
- Though the highway analysis identified trucks carrying all U.S. DOT hazard classes except Class 7 (Radioactive), Class 3 (Flammable Liquids) was by far the most-observed class. As such, responders are most likely to face highway-based hazardous materials incidents involving flammable liquids.

3.0 RAILWAY ANALYSIS

3.1 Statistics

Since the middle of the 19th century, railroads have been active players in the transport of large quantities of commodities because of their low cost and relative speed. As the transport of hazardous materials has increased on roadways, so too have railways seen an increase in their transport.

The Federal Railroad Administration (FRA) compiles statistics on the causes of train accidents. Table 3.2.1 illustrates the cause of train accidents from 2008 to 2017 (http://safetydata.fra.dot.gov/officeofsafety/default.aspx).

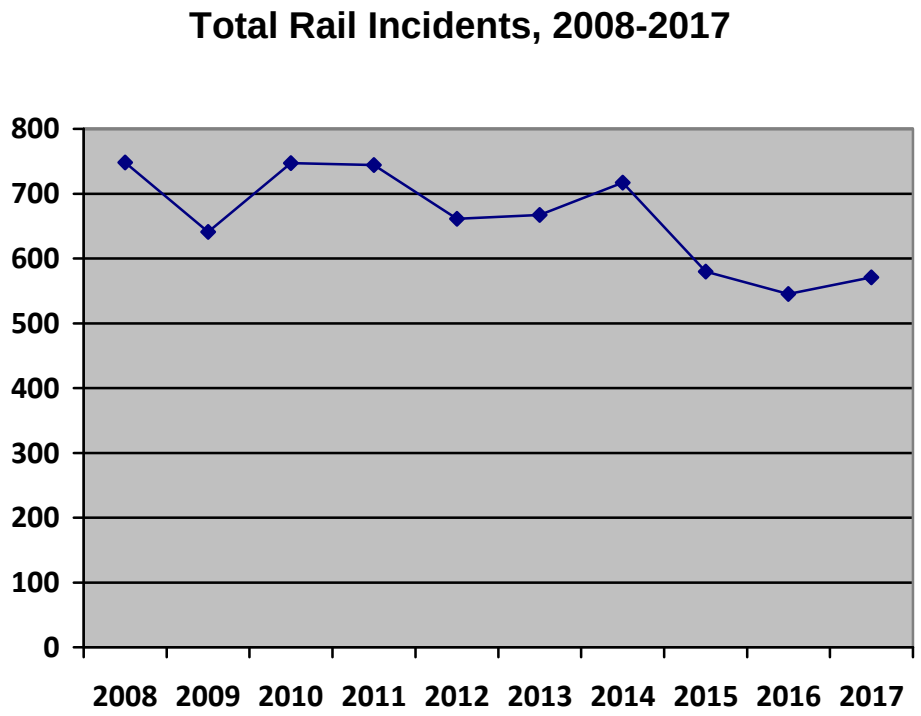
Table 3.2.1

Cause of Train Accidents, 2008-2017

Cause	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Track, Roadbed, Structures	858	671	674	695	591	570	545	531	476	469
Signal & Communications	52	52	67	33	48	54	47	54	41	45
Mechanical or Electrical Failure	321	268	250	236	208	230	240	264	243	240
Human Factor	910	656	650	752	666	713	743	762	632	651
Miscellaneous Causes	340	265	261	316	252	286	309	320	242	488
TOTALS	2,481	1,912	1,902	2,032	1,765	1,853	1,884	1,931	1,634	1,893

The U.S. Department of Transportation (DOT) reports that the number of railroad accidents involving hazardous materials has steadily decreased. Figure 3.2.a depicts railway accident trends for the previous ten years. (http://www.phmsa.dot.gov/hazmat/library/data-stats/incidents).

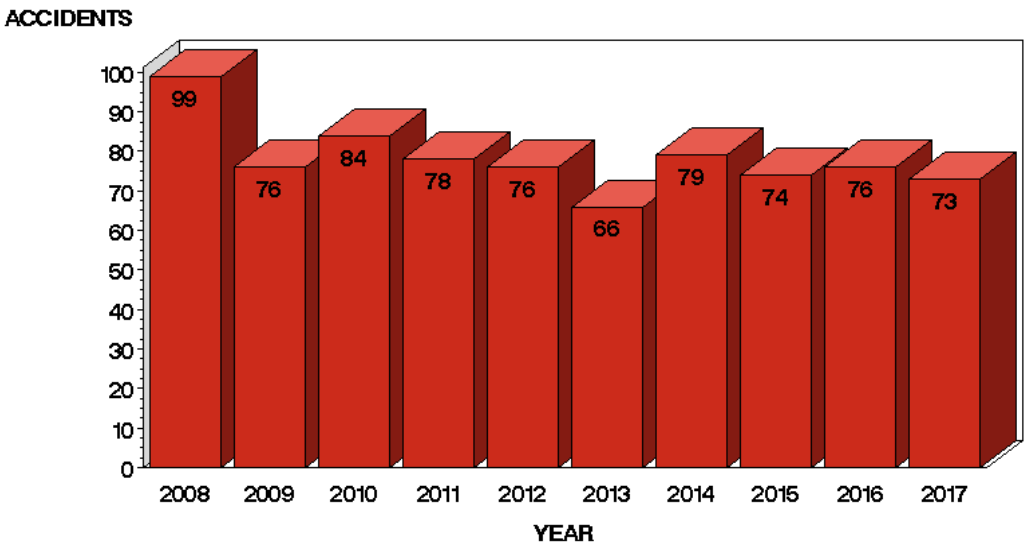
Figure 3.2.a



The number of rail hazardous material accidents, as can be seen, is low. 99.997% of rail shipments involving hazardous materials reach their destination without incident. Rail hazmat accident rates are down 94% since 1980 and 62% since 2000 (Association of American Railroads, https://www.aar.org/Pages/Railroads-Deliver-Hazardous-Materials-Safely.aspx.)

Figure 3.2.b depicts the total number of train accidents in Ohio during the period 2008 to 2017 (FRA, http://safetydata.fra.dot.gov/officeofsafety/publicsite/Query/stchart.aspx).

Figure 3.2.b



Further, according to the FRA, there have been a total of 48 railroad accidents/incidents in Stark County since 2008 (https://safetydata.fra.dot.gov/officeofsafety/publicsite/Query/inctally3.aspx). The most accidents occurred in 2014 with nine.

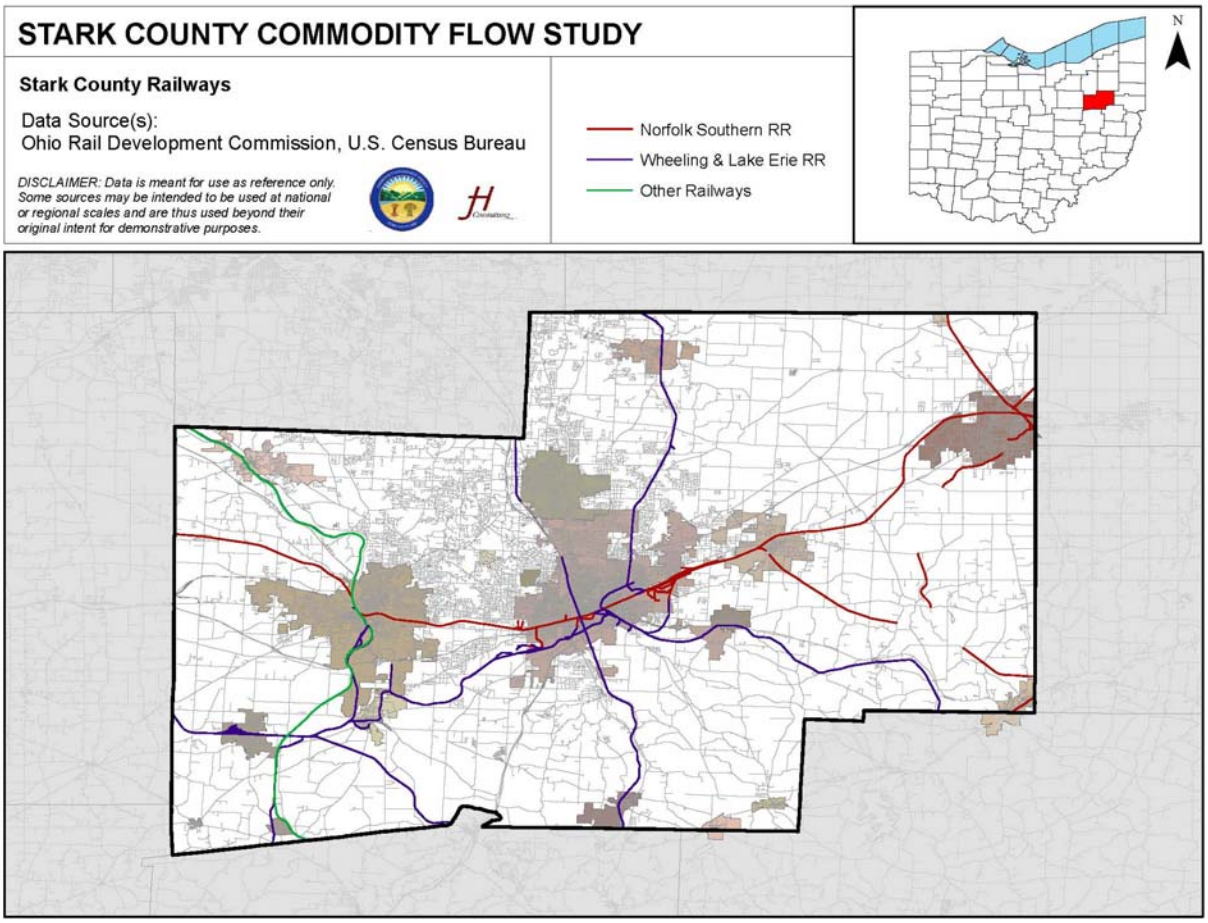
3.2 Methodology

Planners collected rail data primarily through coordination with the prominent rail companies operating in Stark County. The local emergency planning committee officially contacted CSX Transportation, Genesee & Wyoming, Inc., Norfolk Southern Railroad, and Wheeling & Lake Erie Railway representatives to gather commodity flow information.

3.3 Field Data

Four companies conduct commodity shipping by rail in Stark County: CSX Transportation, Genesee & Wyoming, Inc., Norfolk Southern Railroad, and Wheeling & Lake Erie Railway. Figure 3.3.a depicts rail lines in Stark County.

Figure 3.3.a



Norfolk Southern and Wheeling & Lake Erie representatives provided statistics regarding hazardous material transport via rail in the county, which represents a 50.00% response rate. Norfolk Southern provided data for two locations in Stark County for a 12-month period ending January 31, 2018: Alliance and Maximo. Wheeling & Lake Erie provided 2017 data. Tables 3.3.1 through 3.3.7 are taken directly from the company submissions. Each table denotes:

- the name of the material,
- its primary hazard class,
- the appropriate UN number,
- the Hazardous Material Response Code (HMRC) associated with the material, and
- the total carloads shipped during the period.

The tables only list the materials carried by ten or more carloads in the study period. Statistics regarding the remainder of materials shipped via these lines (i.e., those comprising nine carloads or less in the study period) follow the appropriate table. Appendix 1 contains all unique materials identified by the rail analysis, regardless of whether they appear in the tables below.

Table 3.3.1

Hazardous Materials Transported via Rail in Stark County – Norfolk Southern (Alliance)

Material	Hazard Class	UN Number	HMRC	Carloads
FAK-Hazardous materials	FAK	N/A	4950150	87,786
FAK-Hazardous materials	FAK	N/A	4950130	27,559
Alcohols, n.o.s.	3	1987	4909152	25,288
Petroleum crude oil	3	1267	4910165	15,787
Petroleum crude oil	3	1267	4910191	12,469
Petroleum gases	2	1075	4905752	3,983
Combustible liquid, n.o.s.	3	1993	4914109	3,614
Propylene	2	3549	4905782	3,549
Propane	2	1075	4905421	3,345
Elevated temperature liquid, n.o.s.	9	3257	4961605	3,094
FAK-Hazardous materials	FAK	N/A	4950110	2,388
Vinyl chloride	2	1086	4905792	2,053
Fuel oil	3	1993	4914168	2,049
Sulfuric acid, spent	*8*	*1832*	*4930042*	*1,335*
Butane	2	1011	4905423	1,197
Hydrocarbons, liquid, n.o.s.	3	3295	4907439	1,109
Sulfuric acid	*8*	*1830*	*4930040*	*1,069*
Hazardous waste, solid, n.o.s.	9	3077	4860102	887
Environmentally hazardous substance, liquid, n.o.s.	9	3082	4960196	789
Environmentally hazardous substance, solid, n.o.s.	9	3077	4962125	783
Waste polychlorinated biphenyls, solid	9	3432	4845195	721
Combustible liquid, n.o.s.	3	1993	4915185	712
Methyl methacrylate	3	1247	4907250	682
Environmentally hazardous substance, solid, n.o.s.	9	3077	4960133	632
Ethanol	3	1170	4909159	596
Benzene	3	1114	4908110	550
Butyl acrylates, stabilized	3	2348	4912215	544
Environmentally hazardous substance, liquid, n.o.s.	9	3082	4960131	536
Petroleum sour crude oil	3	3494	4910599	505
Batteries, wet, filled	8	2794	4936556	412
Hydrochloric acid	8	1789	4930228	398

Material	Hazard Class	UN Number	HMRC	Carloads
Phenol, molten	*6*	*2312*	*4921598*	*392*
Other regulated substances, liquid, n.o.s.	9	3082	4966109	386
Carbon dioxide	2	2187	4904509	334
Sodium hydroxide solution	8	1824	4935240	304
Cartridges for weapons	1	XX12	4903170	302
Polymeric beads	9	2211	4941144	297
Corrosive liquid, acidic, organic, n.o.s.	8	3265	4931466	281
Combustible liquid, n.o.s.	d	1993	4914108	278
Toluene	3	1294	4909305	254
Battery fluid, acid	8	2796	4930216	253
Acetone	3	1090	4908105	231
Ethylene oxide	2	1040	4920353	216
Methanol	3	1230	4909230	203
Styrene monomer stabilized	3	2055	4907265	187
Butane	2	1075	4905424	183
Xylenes	3	1307	4909348	180
Elevated temperature liquid, flammable, n.o.s.	3	3256	4912818	161
Fish meal, stabilizer	9	2216	4945328	160
Elevated temperature liquid, n.o.s.	9	3257	4961615	160
Aerosols	2	1950	4905709	158
Ammonium nitrate based	5	2067	4918310	156
Environmentally hazardous substance, liquid, n.o.s.	9	3082	4961630	154
Tripropylene	3	2057	4909249	152
Elevated temperature liquid, n.o.s.	9	3257	4961606	145
Environmentally hazardous substance, liquid, n.o.s.	9	3082	4960160	144
Ammonia solutions	*8*	*2672*	*4935280*	*139*
Isopropanol	3	1219	4909205	138
Ethyl acrylate	3	1917	4907215	133
1,1,1,2-Tetrafluoroethane	2	3159	4904304	129
Waste	9	3077	4875543	118
Ethanol and gasoline mixture	3	3475	4908170	114
Paint	3	1263	4910101	110
Ethanol and gasoline mixture	3	3475	4908179	104
Heptanes	3	1206	4909190	103
Elevated temperature liquid, flammable, n.o.s.	3	3256	4912505	97
Sodium nitrate	5	1498	4918746	95
Fluorosilicic acid	8	1778	4930026	94
Environmentally hazardous substance, solid, n.o.s.	9	3077	4960104	94
Environmentally hazardous substance, solid, n.o.s.	9	3077	4961317	94
Amines, liquid	8	2735	4935601	92
Chlorine	*2*	*1017*	*4920523*	*90*
Flammable liquids, n.o.s.	3	1993	4910185	87
Potassium hydroxide, solution	8	1814	4935230	87
Isopropenylbenxene	3	2303	4912631	84

Material	Hazard Class	UN Number	HMRC	Carloads
Battery fluid, acid	8	2796	4932320	84
Isobutylene	2	1055	4905748	80
Hydrogen peroxide	5	2014	4918775	80
Environmentally hazardous substance, liquid, n.o.s.	9	3082	4960114	79
Ethanolamine	8	2491	4935665	78
Benzyl chloride	*6*	*1738*	*4921209*	*76*
Naphthalene, molten	4	2304	4917473	72
Acrylamide solution	*6*	*3426*	*4925151*	*72*
1-Chloro-1, 1-Difluoro-	2	2517	4905720	69
Lighters	2	1057	4905726	68
Petroleum distillates	3	1268	4914256	68
Freight all kinds	FAK	N/A	4850150	67
1,1-Difluoroethane	2	1030	4905716	67
Ethyl methyl ketone	3	1193	4909243	64
Gasoline	3	1203	4908177	63
Elevated temperature liquid, n.o.s.	9	3257	4960156	63
Waste environmentally hazardous substance, solid	9	3077	4860133	62
Propylene oxide	*3*	*1280*	*4906620*	*62*
Environmentally hazardous substance, solid, n.o.s.	9	3077	4961310	62
Environmentally hazardous substance, liquid, n.o.s.	9	3082	4966999	62
Methacrylic acid, stabilized	8	2531	4930251	59
Environmentally hazardous substance, liquid, n.o.s.	9	3082	4963705	57
Alcoholic beverages	3	3065	4910102	56
Environmentally hazardous substance, liquid, n.o.s.	9	3082	4960121	55
Adhesives	3	1133	4912604	54
Esters, n.o.s.	3	3272	4907614	53
Propionaldehyde	3	1275	4908270	53
Extracts, flavoring	3	1197	4910181	53
Ferric chloride, solution	8	2582	4932342	53
Butanols	3	1120	4909130	52
Phosphorus trichloride	*6*	*1809*	*4921016*	*50*
Corrosive liquid, basic, organic, n.o.s.	8	3267	4935263	50
Sulfur, molten	9	2448	4945770	48
Toluene diisocyanate	*6*	*2078*	*4921575*	*47*
Radioactive material, low specific activity	7	2912	4929133	47
Formaldehyde solutions	*8*	*2209*	*4932003*	*45*
Nitric acid	*8*	*2031*	*4930223*	*42*
Ethyl acetate	3	1173	4909160	41
Resin solution	3	1866	4910280	41
Combustible liquid, n.o.s.	3	1993	4913250	39
Hydrogen fluoride, anhydrous	8	1052	4930024	39
Elevated temperature liquid, n.o.s.	9	3257	4960147	39
Pentanes	3	1265	4908255	38
Acetonitrile	3	1648	4909202	38

Material	Hazard Class	UN Number	HMRC	Carloads
1-Methoxy-2-Propanol	3	3092	4909313	38
Cresols, liquid	6	2076	4921706	37
Vinyl acetate, stabilizer	3	1301	4907270	36
Flammable solids, organic, n.o.s.	4	1325	4917332	36
Toxic solid, inorganic, n.o.s.	6	3288	4925250	36
Zinc chloride	8	2331	4935697	36
Environmentally hazardous substance, liquid, n.o.s.	9	3082	4960168	36
Hazardous waste, solid, n.o.s.	9	3077	4860107	35
Gasoline	3	1203	4908178	34
N-Methylaniline	6	2294	4925137	34
Corrosive liquids, n.o.s.	8	1760	4936540	34
N-Propanol	3	1274	4909267	34
Paint	3	1263	4910251	33
Sodium carbonate	5	3378	4918769	33
Elevated temperature liquid, n.o.s.	9	3257	4961607	33
Methyl acetate	3	1231	4908220	32
Ethanol	3	1170	4909118	32
Ammonium nitrate	5	1942	4918311	32
Lithium ion batteries	9	3480	4966703	31
Compressed gas, n.o.s.	2	1956	4904515	30
Fire extinguishers	2	1044	4904820	30
Safety devices	9	3268	4966333	30
Isobutane	2	1075	4905430	29
Sodium methylate	3	1289	4907690	29
Perfumery products	3	1266	4910423	29
Trichloroisocyanuric acid, dry	5	2468	4918448	28
Acetic acid, glacial	8	2789	4931303	28
Waste	3	1993	4810118	27
Combustible liquid, n.o.s	3	1993	4915181	27
2-Chloropyridine	6	2822	4921614	27
Environmentally hazardous substance, liquid, n.o.s.	9	3082	4960215	27
Refrigerant gas r404a	2	3337	4904895	26
Flammable liquids, n.o.s.	3	1993	4909219	26
Polychlorinated biphenyls, solid	9	3432	4945195	26
Environmentally hazardous substance, liquid, n.o.s.	9	3082	4960137	26
Chlorodifluoromethane	2	1018	4904552	25
Octanes	3	1262	4908188	25
Alcohols, n.o.s.	3	1987	4909103	25
Corrosive liquids, n.o.s.	8	1760	4930201	25
Corrosive solid, basic, inorganic, n.o.s.	8	3262	4935254	25
Asbestos	9	2212	4962124	25
Adhesives	3	1133	4910109	24
Combustible liquid, n.o.s.	3	1993	4914009	24
Corrosive liquid, basic, organic, n.o.s.	8	3267	4931259	24
Vehicle, flammable liquid	9	3166	4941147	24
Environmentally hazardous substance, solid, n.o.s.	9	3077	4963399	24

Material	Hazard Class	UN Number	HMRC	Carloads
Aerosols	2	1950	4904258	23
Hydrogen peroxide and peroxyacetic acid mixtures, stabilized	5	3149	4918810	23
Corrosive liquids, toxic, n.o.s.	8	2922	4936015	23
Life-saving appliances	9	2990	4941146	23
Hazardous waste, solid, n.o.s.	9	3077	4860134	22
Chemical under pressure	2	2501	4905867	22
Gasoline	3	3501	4908175	22
Petroleum distillates	3	1268	4910242	22
Combustible liquid, n.o.s.	3	1993	4915276	22
Ferrous chloride solution	8	1760	4932329	22
Lithium ion batteries	9	3481	4966704	22
Propylene	2	1075	4905784	22
Hypochlorite solutions	8	1791	4932378	21
Liquefied petroleum gas	2	1075	4905419	20
Flammable liquids, n.o.s.	3	1993	4909328	20
Ammonium nitrate, liquid	5	2426	4918774	20
Organic peroxide, type F, liquid	5	3109	4918982	20
Sodium chloroacetate	6	2659	4925119	20
Difluoromethane	2	3252	4905444	19
Matches, safety	4	1944	4917356	19
Dichloromethane	6	1593	4925131	19
Furfuryl alcohol	6	2874	4925208	19
Sulfamic acid	8	2967	4932374	19
Hydrazine, aqueous	8	2030	4935030	19
Environmentally hazardous substance, liquid, n.o.s.	9	3082	4960186	19
Hazardous waste, solid, n.o.s.	9	3077	4875648	18
Carbon dioxide	2	1013	4904535	18
Diethyl ether	3	1155	4908156	18
Isobutanol	3	1212	4909124	17
Methyl isobutyl ketone	3	1245	4909244	17
Resin solution	3	1866	4910221	17
Vinyltoluenes, stabilized	3	2618	4912275	17
Sulfuric acid	*8*	*1830*	*4930039*	*17*
Benzoyl chloride	*8*	*1738*	*4931725*	*17*
Corrosive solids, toxic, n.o.s.	8	2923	4936353	17
Environmentally hazardous substance, solid, n.o.s.	9	3077	4960161	17
Waste	3	1993	4810560	16
Butyl acrylates, stabilized	3	2348	4909128	16
Printing ink	3	1210	4910205	16
Extracts, flavoring	3	1197	4914181	16
Self-heating solids	4	3088	4916163	16
Phosphoric acid solution	8	1805	4930247	16
Petroleum distillates	3	1268	4910256	15
Environmentally hazardous substance, liquid, n.o.s.	9	3082	4960206	15
Engines, internal	9	3166	4961166	15
Adhesives	3	1133	4912368	15
Alcohols, n.o.s.	3	1987	4913128	15

Material	Hazard Class	UN Number	HMRC	Carloads
Combustible liquids, n.o.s.	3	1993	4913246	15
Ammonium persulfate	5	1444	4918706	15
Ethylenediamine	*8*	*1604*	*4935628*	*15*
Cases, cartridge, empty	1	XX55	4903154	14
Hexanes	3	1208	4908183	14
Isopropanol	3	1219	4909227	14
Combustible liquid, n.o.s.	3	1993	4915209	14
Combustible liquid, n.o.s.	3	1993	4915473	14
Bisulfites, aqueous	8	2693	4932376	14
Sodium hydroxide, solution	8	1824	4935206	14
Sodium hydroxide, solid	8	1823	4935235	14
Waste	9	3077	4860198	13
Air, compressed	2	1002	4904501	13
Aerosols, flammable	2	1950	4905719	13
Extracts, aromatic	3	1169	4910364	13
Acetic anhydride	8	1715	4931304	13
Corrosive liquid, acidic, inorganic, n.o.s.	8	3264	4931463	13
Other regulated substances, liquid, n.o.s.	9	3082	4940322	13
Pentanols	3	1105	4909107	12
Paint-related materials	3	1263	4910150	12
Magnesium	4	1869	4917509	12
Pyrethroid pesticide	6	3349	4921554	12
Formic acid	8	1779	4931320	12
Alkyl sulfuric acids	8	3259	4932309	12
Amines, solid, corrosive, n.o.s.	8	3259	4936219	12
Disinfectants, liquid	8	1903	4936561	12
Elevated temperature liquid, n.o.s.	9	3257	4961619	12
Environmentally hazardous substance, liquid, n.o.s.	9	3082	4966317	12
Butane	2	1075	4905789	11
Flammable liquids	3	2924	4907829	11
Petroleum distillates	3	1268	4909382	11
Resin solution	3	1866	4910282	11
Combustible liquids, n.o.s.	3	1993	4913101	11
2-Ethylhexyl	6	2748	4921306	11
Corrosive liquid, basic, organic, n.o.s.	8	3267	4932032	11
Trifluoroacetic acid	8	2699	4932391	11
Environmentally hazardous substance, solid, n.o.s.	9	3077	4960173	11
Environmentally hazardous substance, liquid, n.o.s.	9	3082	4960187	11
Battery-powered vehicle	9	3171	4961601	11
Aerosols	2	1950	4904312	10
Environmentally hazardous substance, liquid, n.o.s.	9	3082	4963330	10
Solids containing flammable liquid, n.o.s.	4	3175	4917344	10
Corrosive liquid, basic, inorganic, n.o.s.	8	3266	4932031	10

Material	Hazard Class	UN Number	HMRC	Carloads
Environmentally hazardous substance, liquid, n.o.s.	9	3082	4960159	10

**EHS Materials*

Table 3.3.2

Hazardous Materials Transported via Rail in Stark County – Norfolk Southern (Maximo)

Material	Hazard Class	UN Number	HMRC	Carloads
Petroleum crude oil	3	1267	4910165	10,786
Alcohols, n.o.s.	3	1987	4909152	10,646
Petroleum crude oil	3	1267	4910191	4,267
Flammable liquid, n.o.s.	3	1993	4914109	2,890
Vinyl chloride	2	1086	4905792	2,001
Elevated temperature liquid, n.o.s.	9	3257	4961605	1,573
LP gases	2	1075	4905752	1,433
Propylene	2	1077	4905782	1,111
Butyl acrylates, stabilized	3	2348	4912215	518
Hydrocarbons, liquid, n.o.s.	3	3295	4907439	496
Petroleum sour crude oil, flammable, toxic	3	3494	4910599	470
Methyl methacrylate monomer, stabilized	3	1247	4907250	446
Butane	2	1075	4905423	291
Environmentally hazardous substance, liquid, n.o.s.	9	3082	4966109	270
Propane	2	1075	4905421	259
Hydrochloric acid	8	1789	4930228	232
Fuel oil	3	1993	4914168	213
Phenol, molten	*6*	*2312*	*4921598*	*211*
Flammable liquid, n.o.s.	3	1993	4914108	202
Sodium hydroxide solution	8	1824	4935240	196
Ammonium nitrate-based fertilizer	5	2067	4918310	106
Waste	9	3077	4875543	104
Ethyl Acrylate	3	1917	4907215	98
Environmentally hazardous substance, solid, n.o.s.	9	3077	2860102	95
FAK-Hazardous materials	N/A	N/A	4950150	90
Butane	2	1075	4905424	84
Acetone	3	1090	4908105	78
Heptanes	3	1206	4909190	72
Ethylene oxide	*2*	*1040*	*4920353*	*72*
Environmentally hazardous substance, solid, n.o.s.	9	3077	4962125	69
Methanol	3	1230	4909230	62
Ethyl methyl ketone	3	1193	4909243	59
Petroleum distillates, n.o.s.	3	1268	4914256	57
Methacrylic acid, stabilized	8	2531	4930251	57
Hydrogen peroxide, solution	5	2014	4918775	56

Material	Hazard Class	UN Number	HMRC	Carloads
Environmentally hazardous substance, liquid, n.o.s.	9	3082	4963705	56
Isopropenylbenzene	3	2303	4912631	54
Propionaldehyde	3	1275	4908270	51
Flammable liquids, n.o.s.	3	1993	4915185	51
Esters, n.o.s.	3	3272	4907614	49
FAK-Hazardous materials	N/A	N/A	4950130	49
Styrene monomer, stabilized	3	2055	4907265	48
Waste polychlorinated biphenyls, solid	9	3432	4845195	47
Toluene diisocyanate	*6*	*2078*	*4921575*	*41*
Flammable liquids, n.o.s.	3	1993	4913250	39
Waste environmentally hazardous substance, solid, n.o.s.	9	3077	5860133	36
Isobutylene	2	1055	4905748	35
Cresols, liquid	6	2076	4921706	35
Butanols	3	1120	4909130	34
Phosphorus trichloride	*6*	*1809*	*4921016*	*33*
Sulfuric acid	*8*	*1830*	*4930040*	*33*
1,1-Difluoroethane	2	1030	4905716	31
Vinyl acetate, stabilized	3	1301	4907270	31
Fluorosilicic acid	8	1778	4930026	31
Propylene oxide	*3*	*1280*	*4906620*	*30*
N-Propanol	3	1274	4909267	29
Nitric acid	*8*	*2031*	*4930223*	*29*
Ammonia solutions	*8*	*2672*	*4935280*	*28*
Hazardous waste, solid, n.o.s.	9	3077	4860107	27
Carbon dioxide, refrigerated liquid	2	2187	4904509	26
Ethanol	3	1170	4909159	25
Formaldehyde solutions	*8*	*2209*	*4932003*	*25*
1,1,1,2-Tetrafluoroethane	2	3159	4904307	24
Isopropanol	3	1219	4909205	24
Benzene	3	1114	4908110	23
Corrosive liquid, basic, organic, n.o.s.	8	3267	4931259	22
Potassium hydroxide, solution	8	1814	4935230	22
Toluene	3	1294	4909305	21
FAK-Hazardous materials	N/A	N/A	4950110	21
Flammable liquids, n.o.s.	3	1993	4909328	20
1-Chloro-1,1-Difluoroethane	2	2517	4905720	19
Hazardous waste, solid, n.o.s.	9	3077	4860134	18
Ethanol and gasoline mixture	3	3475	4908170	18
Xylenes	3	1307	4909348	17
Furfuryl alcohol	6	2874	4925208	17
Environmentally hazardous substance, liquid, n.o.s.	9	3082	4960186	17
Butyl acetates	3	1123	4909128	16
Pentanes	3	1265	4908255	15
Alcohols, n.o.s.	3	1987	4913128	15
Flammable liquids, n.o.s.	3	1993	4915209	14
Hydrogen fluoride, anhydrous	*8*	*1052*	*4930024*	*14*
Ferric chloride, solution	8	2582	4932342	14

Material	Hazard Class	UN Number	HMRC	Carloads
Acrylamide solution	*6*	*3426*	*4925151*	*13*
Acetic acid, glacial	8	2789	4931303	13
Combustible liquid, n.o.s.	3	1993	4913246	12
Acetic anhydride	8	1715	4931304	12
Environmentally hazardous substance, liquid, n.o.s.	9	3082	4960137	12
Environmentally hazardous substance, liquid, n.o.s.	9	3082	4966317	12
Ammonium nitrate, liquid	5	2426	4918774	12
Gasoline	3	1203	4908178	11
Alcoholic beverages	3	3065	4910102	11
Vinyltoluenes, stabilized	3	2618	4912275	11
Ammonium nitrate	5	1942	4918311	11
2-Ethylhexyl	6	2748	4921306	11
Dichloromethane	6	1593	4925131	11
Elevated temperature liquid, n.o.s.	9	3257	4961606	11
Pentanols	3	1105	4909107	10
Methyl isobutyl ketone	3	1245	4909244	10
Amines, liquid	8	2735	4935601	10

**EHS Materials*

The materials in Table 3.3.2 comprised 99.28% of all carloads through Maximo during the study period. The remaining 300 carloads (0.72% of a total of 41,525 carloads) carried 92 material types. Of those types, the following appear on the EPA's list of EHS materials.

- **Chlorine (Class 2, UN 1017):** 6 carloads
- **Sulfur dioxide (Class 2, UN 1079):** 1 carload

Table 3.3.3

Hazardous Materials Transported via Rail in Stark County – Wheeling & Lake Erie (Brewster to Canton through Hartville)

Material	Hazard Class	UN Number	HMRC	Carloads
Styrene monomer	3	2055	4907265	257
Ethanol solution	3	1170	4909159	233
Allyl alcohol	6	1098	4921019	90
Butadienes, stabilized	2	1010	4905704	79
Combustible liquid, n.o.s.	3	1993	4913204	64
Propane	2	1075	4905421	41
Butane	2	1075	4905424	23

The materials in Table 3.3.3 account for 84.62% of the total materials

transported on this line.

Table 3.3.4

Hazardous Materials Transported via Rail in Stark County – Wheeling & Lake Erie (Brewster to Canton through Navarre)

Material	Hazard Class	UN Number	HMRC	Carloads
LP gases	2	1075	4905725	4,119
Elevated temperature liquid, n.o.s.	9	3257	4961605	2,285
Petroleum crude oil	3	1267	4910165	1,741
Butane	2	1075	4905424	1,615
Propane	2	1075	4905421	1,457
Isobutane	2	1075	4905430	1,266
Alcohols, n.o.s.	3	1987	4909152	295
Styrene monomer	3	2055	4907265	53
Hydrocarbons, liquid, n.o.s.	3	3295	4907439	52
Ethanol solution	3	1170	4909159	37
Butadienes	2	1010	4905704	27
Allyl alcohol	6	1098	4921019	18

The materials in Table 3.3.4 comprise 99.80% of the total materials transported on this line.

Table 3.3.5

Hazardous Materials Transported via Rail in Stark County – Wheeling & Lake Erie (Jewett through Harman to Brewster)

Material	Hazard Class	UN Number	HMRC	Carloads
Propane	2	1075	4905421	23,933
LP gases	2	1075	4905752	7,475
Butane	2	1075	4905424	6,089
Hydrocarbons, liquid	3	3295	4907439	3,061
Isobutane	2	1075	4905430	1,621
Petroleum distillates, n.o.s.	3	1268	4909382	1,423
Pentanes	3	1265	4908255	54
Alcohols, n.o.s.	3	1987	4909152	43
Butylene	2	1012	4905715	26
Propylene	2	1077	4905782	24

**EHS Materials*

The materials in Table 3.3.5 comprise 99.97% of the materials transported on this line. WLE reported three other materials, each transported in less than ten carloads, on the line.

- **Chlorine (Class 2, UN 1017):** 2 carloads
- **Gasoline (Class 3, UN 1203):** 4 carloads
- **Liquefied gas, flammable, n.o.s. (Class 2, UN 3161):** 8 carloads

Table 3.3.6

Hazardous Materials Transported via Rail in Stark County – Wheeling & Lake Erie (Mingo Junction through Harman to Brewster)

Material	Hazard Class	UN Number	HMRC	Carloads
LP gases	2	1075	4905752	517
Hydrocarbons, liquid, n.o.s.	3	3295	4907439	305
Chlorine	*2*	*1017*	*4920523*	*341*
Butane	2	1075	4905424	279
Petroleum crude oil	3	1267	4910165	127
Petroleum distillates, n.o.s.	3	1268	4909382	67
Isobutane	2	1075	4905430	58
Radioactive material, low, specific activity	7	2912	4929133	41
Propane	2	1075	4905421	26

**EHS Materials*

Table 3.3.7

Hazardous Materials Transported via Rail in Stark County – Wheeling & Lake Erie (Mineral City through Canton South to Canton, Brewster)

Material	Hazard Class	UN Number	HMRC	Carloads
Petroleum crude oil	3	1267	4910165	3,006

The material in Table 3.3.7 comprises 100% of the carloads on this line.

The rail analysis yielded the following 193 unique hazardous materials. Twenty-eight (28) of those materials also appeared in the highway analysis, and two of those 28 also appeared in the pipeline analysis. As such, 85.49% of the materials identified in the railway analysis were unique to rail transport at the time of this study.

The rail analysis also yielded 16 additional EPA-designated “extremely hazardous substance” materials, listed in Table 3.3.8.

Table 3.3.8

EHS Transported via Rail

Extremely Hazardous Substances (EHS)	Total Carloads
Chlorine (UN 1017)	NSRR 90 WLE 341
Ethylene oxide (UN 1040)	NSRR 288
Hydrogen fluoride, anhydrous (UN 1052)	NSRR 43
Sulfur dioxide (UN 1079)	NSRR 1
Propylene oxide (UN 1280)	NSRR 92
Ethylenediamine (UN 1604)	NSRR 15
Benzyl chloride (UN 1738)	NSRR 76
Phosphorus trichloride (UN 1809)	NSRR 83
Sulfuric acid† (UN 1830)	NSRR 1119
Sulfuric acid, spent (UN 1832)	NSRR 1335
Nitric acid (UN 2031)	NSRR 71
Toluene diisocyanate (UN 2078)	NSRR 88
Formaldehyde solutions (UN 2209)	NSRR 70
Phenol, molten (UN 2312)	NSRR 603
Ammonia solutions (UN 2672)	NSRR 167
Acrylamide solution (UN 3426)	NSRR 85
TOTALS	4,567

†*Also appeared in the highway analysis.*

3.4 Conclusions

Table 3.4.1 presents the top 10 materials identified by the railway analysis.

Table 3.4.1

Top 10 Materials – Railway Analysis

Material Name (and UN Number)	Total Cars	Total Shippers Reporting Material
FAK-Freight All Kinds (HMRC 4950150, No UN)	87,786	1 NSRR
Alcohols, n.o.s. (HMRC 4909152, UN 1987)	36,272	1 NSRR
Petroleum crude oil (HMRC 4910165, UN 1267)	31,425	2 NSRR, WLE
Propane (HMRC 4905421, UN 1075)	28,776	2 NSRR, WLE
FAK-Freight All Kinds (HMRC 4950130, No UN)	27,559	1 NSRR
Petroleum gases (HMRC 4905752 (UN 1075)	17,475	2 NSRR, WLE
Petroleum crude oil (HMRC 4910191, UN 1267)	16,736	1 NSRR
Butane (HMRC 4905424, UN 1075)	7,996	2 NSRR, WLE
Elevated temperature liquid, n.o.s. (HMRC 4961605, UN 3257)	6,952	1 NSRR
Flammable (Combustible) liquids, n.o.s. (HMRC 4914109, UN 1993)	6,504	2 NSRR, WLE

Twenty-eight (28) materials specifically reported in the railway analysis also appeared in the highway analysis.

- LP gases (UN 1075)
- Ethyl alcohol (UN 1170)
- Gasoline (UN 1203)
- Petroleum crude oil (UN 1267) †
- Petroleum distillates (UN 1268)†
- Toluene (UN 1294)
- Ferrous chloride, solution (UN 1760)
- Hydrochloric acid (UN 1789)
- Hypochlorite solutions (UN 1791)
- Sodium hydroxide, solution (UN
- Asbestos (UN 2212)
- Isopropenylbenzene (UN 2303)
- Sulfur, molten (UN 2448)
- Ferric chloride, solution (UN 2582)
- Environmentally hazardous substances, solid, n.o.s. (UN 3077)
- Environmentally hazardous substances, liquid, n.o.s. (UN 3082)
- Organic peroxide, type F, liquid (UN 3109)
- Elevated temperature liquid, n.o.s.

1824)
- Sulfuric acid (UN 1830)
- Argon, refrigerated liquid (UN 1951)
- Alcohols, n.o.s. (UN 1987)
- Flammable liquids, n.o.s. (UN 1993)
- Hydrogen peroxide (UN 2014)
- Carbon dioxide, refrigerated liquid (UN 2187)
- (UN 3257)
- Corrosive liquid, acidic, organic, n.o.s. (UN 3265)
- Corrosive liquid, basic, inorganic, n.o.s. (UN 3266)
- Hydrocarbons, liquid, n.o.s. (UN 3295)
- Ethanol/gasoline mixture (UN 3475)

[†]*Also appeared in the pipeline analysis.*

Railway analysis data suggests the following conclusions.

- The railway analysis contributed significantly more unique hazardous materials to the study than did the highway or pipeline analysis. To some extent, this finding was intuitive, given rail's relative low cost and safety record. However, planners would expect additional overlap with the highway analysis. Future studies should consider additional highway monitoring to allow for a more thorough comparison.
- The railway analysis yielded this large number of unique hazardous materials with only 50% of the active rail operators in Stark County reporting. The other two operators may contribute more unique materials for consideration.

4.0 PIPELINE ANALYSIS

4.1 Statistics

According to the U.S Department of Transportation's Pipeline and Hazardous Materials Safety Administration (PHMSA), there are over 215,000 miles of hazardous liquid and carbon dioxide pipelines; over 300,000 miles of gas transmission pipelines; over 2,223,000 miles of gas distribution mains and services pipelines; and 152 LNG facilities, containing 228 LNG tanks, connected to gas transmission and distribution systems (2017).

A significant amount of data is available regarding incidents on pipeline systems. Table 4.2.1 shows a summary of all reported pipeline incidents over the period of 2008 through 2017. The following figures provide additional data on these incidents.

Table 4.1.1

Summary – All Reported Pipeline Incidents, 2008-2017

Year	Incidents	Fatalities	Injuries	Total Cost Reported ($)
2008	660	8	56	$565,532,340
2009	627	13	64	$179,070,183
2010	586	22	108	$1,692,500,877
2011	588	13	55	$426,129,361
2012	571	12	57	$229,842,664
2013	618	9	44	$368,909,704
2014	706	19	95	$315,690,250
2015	712	11	48	$349,959,166
2016	633	16	87	$321,119,822
2017	650	20	35	$270,882,151
Total	6,351	143	649	$4,719,636,518
Most Recent 3 Year Avg.	665	16	57	$313,987,043

Figure 4.1.a

All Reported Pipeline Incidents: Count 1998-2017

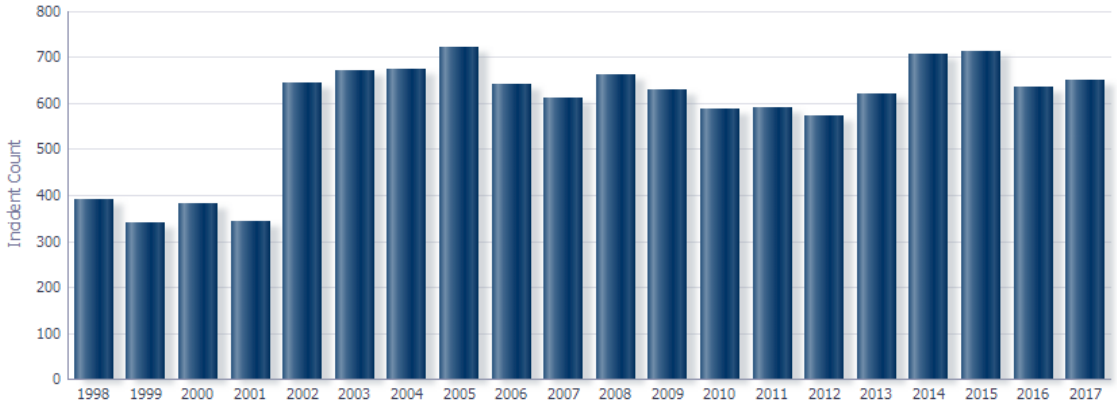


Figure 4.1.b

All Reported Pipeline Incidents: Fatalities 1998-2017

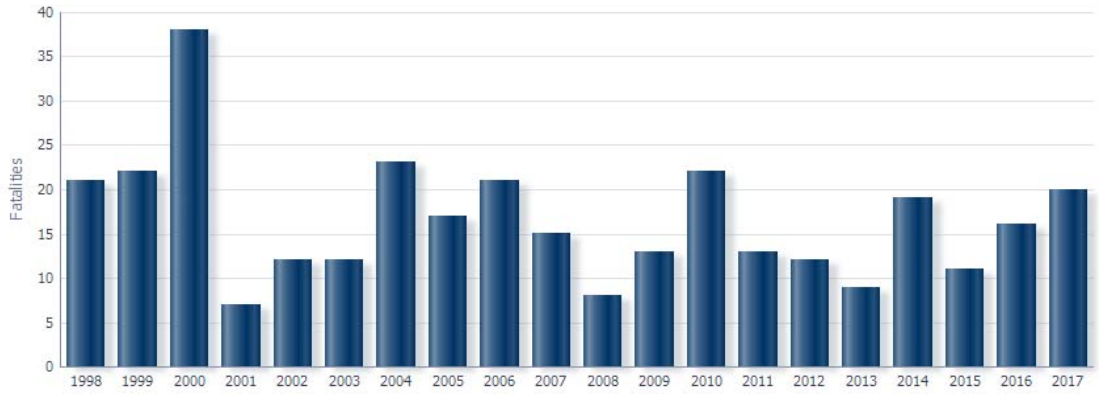
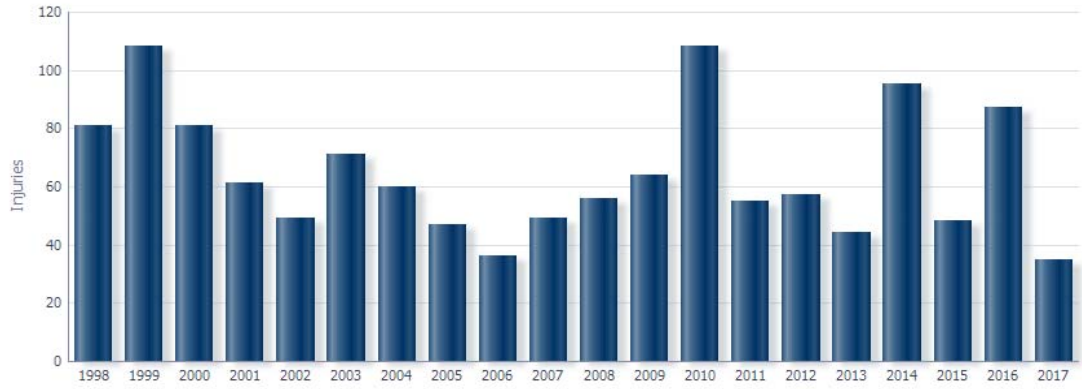


Figure 4.1.c

All Reported Pipeline Incidents: Injuries 1998-2017



Within these figures, PHMSA reports incidents within the hazardous liquid, gas transmission, gas gathering, and gas distribution subcategories. Tables 4.1.2 through 4.1.5 present these figures for the period 2008-2017 for onshore incidents only (PHMSA, 2017).

Table 4.1.2

Hazardous Liquid Pipeline Incidents, 2008-2017

Year	Incidents	Fatalities	Injuries	Total Cost Reported ($)
2008	123	2	2	$165,260,978
2009	110	4	4	$79,971,490
2010	123	1	3	$1,202,890,666
2011	139	0	1	$297,680,975
2012	134	3	4	$152,726,471
2013	166	1	6	$291,099,972
2014	154	0	0	$135,305,833
2015	181	1	0	$259,641,566
2016	177	3	9	$205,135,519
2017	157	1	1	$147,154,891
Total	1,464	16	30	$2,936,868,361
Most Recent 3 Year Avg.	172	2	3	$203,977,325

Table 4.1.3

Gas Transmission Pipeline Incidents, 2008-2017

Year	Incidents	Fatalities	Injuries	Total Cost Reported ($)
2008	73	0	5	$280,164,446
2009	73	0	11	$58,673,943
2010	79	10	61	$662,171,658
2011	84	0	1	$132,489,046
2012	62	0	7	$57,809,740
2013	71	0	2	$51,889,186
2014	77	1	1	$53,506,217
2015	79	6	16	$58,924,529
2016	56	3	3	$57,896,150
2017	66	3	3	$38,142,596
Total	720	23	110	$1,451,667,511
Most Recent 3 Year Avg.	67	4	7	$51,654,425

Table 4.1.4

Gas Gathering Pipeline Incidents, 2008-2017

Year	Number	Fatalities	Injuries	Total Cost Reported ($)
2008	16	0	0	$137,516,716
2009	12	0	0	$18,625,559
2010	7	0	0	$2,208,379
2011	6	0	0	$1,750,082
2012	7	0	0	$3,111,500
2013	6	0	0	$2,101,026
2014	9	0	0	$6,236,237
2015	3	0	0	$1,616,218
2016	2	0	0	$587,685
2017	7	0	0	$1,420,885
Total	75	0	0	$175,174,287
Most Recent 3 Year Avg.	4	0	0	$1,208,263

Table 4.1.5

Gas Distribution Pipeline Incidents, 2008-2017

Year	Number	Fatalities	Injuries	Total Cost Reported ($)
2008	67	6	47	$20,767,955
2009	80	9	47	$26,763,193
2010	55	8	39	$20,497,511
2011	56	11	48	$23,442,367
2012	52	7	43	$24,954,682
2013	60	7	34	$37,020,712
2014	60	18	92	$73,320,857
2015	66	2	32	$30,579,618
2016	74	10	74	$53,952,014
2017	63	4	29	$68,370,642
Total	633	82	485	$379,669,551
Most Recent 3 Year Avg.	68	5	45	$50,967,425

Pipeline mileage data for states is somewhat more detailed than it is nationwide. PHSMA reports a total of 116,529 miles of pipeline in Ohio (2017). Within those 116,529 miles:

- 4,725 miles are hazardous liquid pipelines;
- 10,119 miles are gas transmission lines;
- 1,184 miles are gas gathering lines; and
- 105,226 miles are gas distribution lines.

Similar classifications of incident data are available at the state level as presented above nationwide. Table 4.1.6 presents a summary of all pipeline incidents in Ohio for the period 2008-2017 (PHMSA, 2017).

Table 4.1.6

Reported Pipeline Incidents in Ohio, 2008-2017

Year	Incidents	Fatalities	Injuries	Total Cost As Reported ($)
2008	18	0	1	$6,963,493
2009	20	1	3	$9,705,604
2010	10	1	7	$2,478,224
2011	17	2	6	$8,347,104
2012	10	0	5	$24,576,321
2013	12	0	1	$1,815,230
2014	19	0	0	$12,050,123
2015	18	0	0	$10,919,199
2016	21	0	2	$6,007,417
2017	21	2	1	$3,630,773
Total	166	6	26	$86,493,488
Most Recent 3 Year Avg.	20	1	1	$6,852,463

Table 4.1.7

Hazardous Liquid Pipeline Incidents in Ohio, 2008-2017

Year	Incidents	Fatalities	Injuries	Total Cost as Reported ($)	Barrels Spilled	Net Barrel Lost
2008	12	0	0	$4,619,238	498	2
2009	13	0	0	$7,694,944	2,424	808
2010	3	0	0	$1,117,092	15	1
2011	5	0	0	$793,795	163	20
2012	5	0	0	$20,506,205	1,974	1,222
2013	7	0	0	$166,080	4	1
2014	13	0	0	$10,116,901	470	14
2015	9	0	0	$287,216	109	5
2016	11	0	0	$2,755,217	420	25
2017	13	0	0	$2,323,439	277	30
Total	91	0	0	$50,380,127	6,354	2,128
Most Recent 3 Year Avg.	11	0	0	$1,788,624	269	20

Table 4.1.8

Gas Transmission Pipeline Incidents in Ohio, 2008-2017

Year	Incidents	Fatalities	Injuries	Total Cost As Reported ($)
2008	2	0	0	$135,108
2009	3	0	1	$581,697
2010	1	0	0	$490,080
2011	6	0	0	$5,579,678
2012	2	0	4	$74,232
2013	1	0	0	$1,501,234
2014	3	0	0	$659,563
2015	5	0	0	$1,123,459
2016	5	0	0	$479,261
2017	2	1	0	$198,254
Total	30	1	5	$10,822,566
Most Recent 3 Year Avg.	4	0	0	$600,325

Table 4.1.9

Gas Gathering Pipeline Incidents in Ohio, 2008-2017

Year	Incidents	Fatalities	Injuries	Total Cost
2008	0	0	0	$0
2009	0	0	0	$0
2010	0	0	0	$0
2011	0	0	0	$0
2012	0	0	0	$0
2013	0	0	0	$0
2014	0	0	0	$0
2015	0	0	0	$0
2016	0	0	0	$0
2017	0	0	0	$0
Total	0	0	0	$0
Most Recent 3 Year Avg.	0	0	0	$0

Table 4.1.10

Gas Distribution Pipeline Incidents in Ohio, 2008-2017

Year	Incidents	Fatalities	Injuries	Total Cost
2008	4	0	1	$2,209,147
2009	4	1	2	$1,428,963
2010	6	1	7	$871,052
2011	6	2	6	$1,973,631
2012	3	0	1	$3,995,884
2013	4	0	1	$147,916
2014	3	0	0	$1,273,659
2015	4	0	0	$9,508,524
2016	5	0	2	$2,772,939
2017	6	1	1	$1,109,080
Total	45	5	21	$25,290,795
Most Recent 3 Year Avg.	5	0	1	$4,463,514

Of the incidents presented in Tables 4.1.7 through 4.1.10, a total of 93 have been described by PHSMA as significant. Significant incidents are those reported incidents with the following specifically-defined consequences:

- A fatality or injury requiring in-patient hospitalization,
- $50,000 or more in total costs, measured in 1984 dollars,
- Highly volatile liquid releases of five barrels or more or "other liquid" release of 50 barrels or more, or
- Liquid releases resulting in an unintentional fire or explosion.

These 97 significant incidents resulted in a total of six fatalities, 26 injuries, and $90,067,675 in total costs reported (PHSMA, 2017). Of the 97 significant incidents, a total of 15 were also serious incidents. Serious incidents are a smaller subset where any fatality or in-patient hospitalization occurs.

4.2 Methodology

Pipeline data came from the National Pipeline Mapping System (https://www.npms.phmsa.dot.gov/). In some cases, when clarification was needed, the county's consultant contacted pipeline operators directly. Section 4.3 below presents local data. The LEPC requested and received geographic information system (GIS) mapping data from PHMSA. This data enabled the spatial analysis included below.

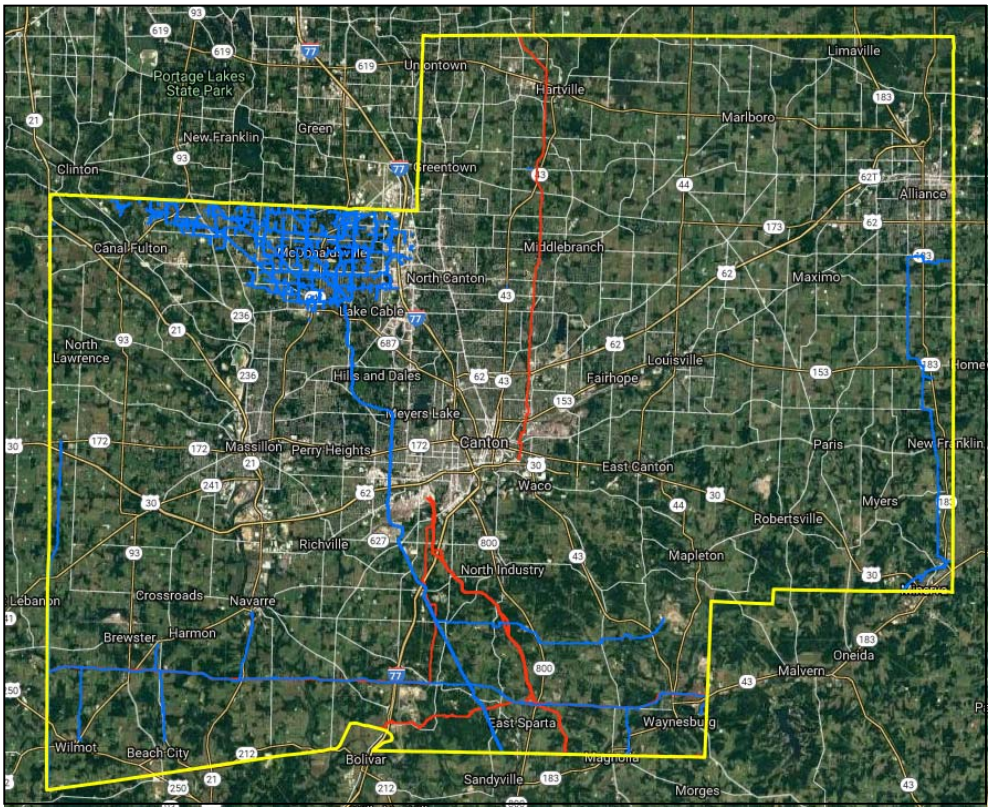
4.3 Field Data

PHMSA reports five accidents involving liquid pipelines in Stark County: 2009 (crude oil released), 2010 (refined petroleum products released), 2013 (refined petroleum products released), 2016 (petroleum products released), and 2017 (crude oil released) (PHMSA, 2017). PHMSA records report one incident involving a natural gas pipeline in 2017 (PHMSA, 2017).

Figure 4.3.a shows the transmission pipelines passing through and near Stark County (https://www.npms.phmsa.dot.gov/). Under 49 CFR § 192.3, a transmission line is: "a pipeline, other than a gathering line, that: (1) transports gas from a gathering line or storage facility to a distribution center, storage facility, or large volume customer that is not down-stream from a distribution center; (2) operates at a hoop stress of 20 percent or more of SMYS; or (3) transports gas within a storage field."

Figure 4.3.a

Pipelines in Stark County



The blue graphics represent the “gas transmission pipelines” referenced above. They carry natural gas (UN 1971). Under §195.2, an HVL line carries a hazardous liquid which will form a vapor cloud when released to the atmosphere and which has a vapor pressure exceeding 276kPa (40psia) at 37.8° C (100° F). The red lines are hazardous liquid pipelines. The red line running from Canton through Hartville and north out of the county is the 5” Suffield to Canton (MOCA) line, operated by Inland Corporation. It is an active line carrying a non-HVL product. The red lines running through the south-central portion of the county are Marathon Petroleum HVL lines. They carry petroleum products (UN 1268), natural gas liquids (UN 1965), and crude oil (UN 1267). The lines running southeast toward the East Sparta area (and from East Sparta toward Bolivar) carry either petroleum products or natural gas liquids. The lines running due south and east toward the Brewster area carry crude oil.

Data from the National Pipeline Mapping System (NPMS) allows for brief spatial analysis in Stark County. Figure 4.3.b is a map showing the pipelines in Stark County by commodity carried.

Figure 4.3.b

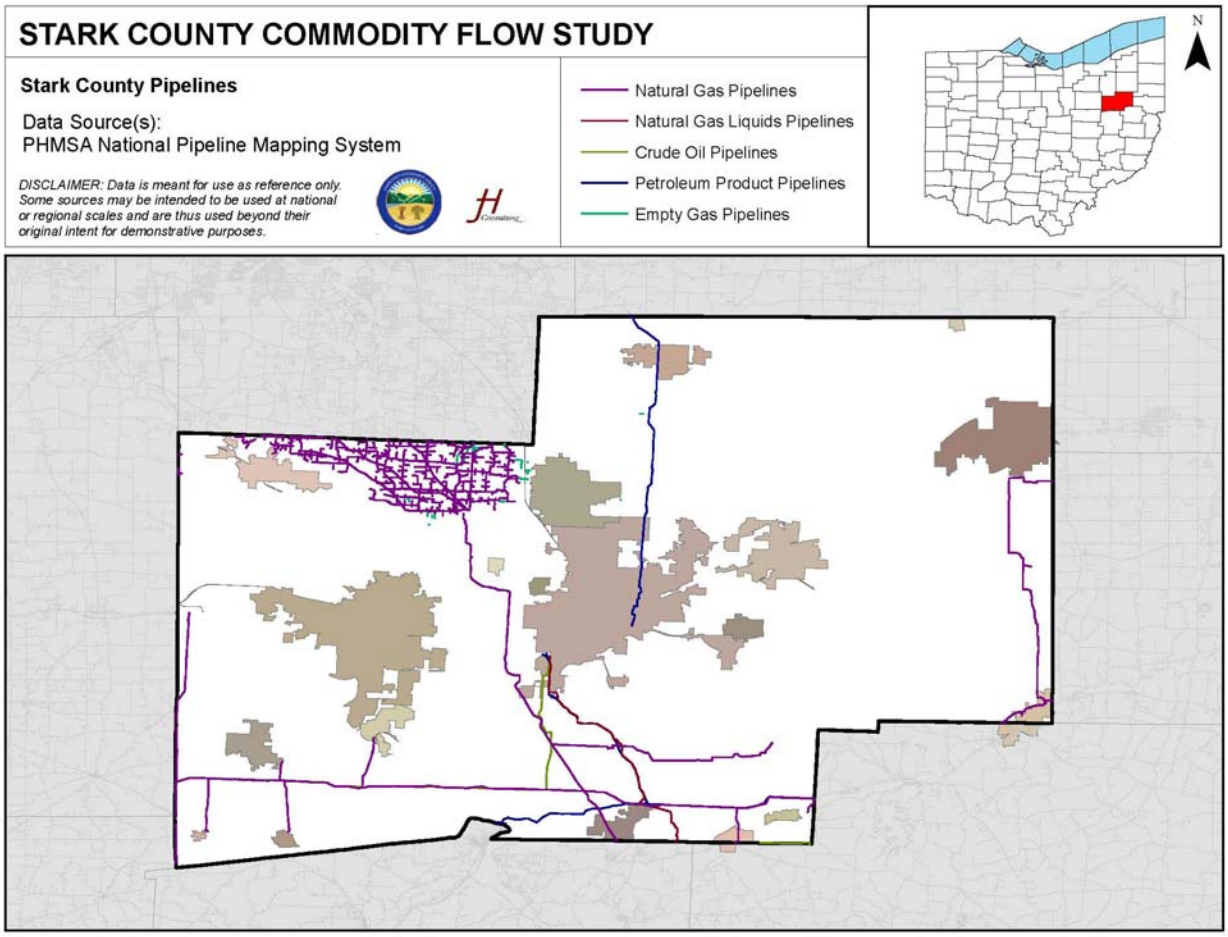


Figure 4.3.c is a high-level spatial analysis. This map shows the pipelines provided by the NPMS. The map includes two buffers from all pipelines: one at a ½ mile and another at one mile. Planners derived the distances from the isolation distances suggested by the latest edition of the U.S. DOT *Emergency Response Guidebook* (DOT, 2016) for the materials identified by the pipeline analysis, impacted by a fire.

Figure 4.3.c

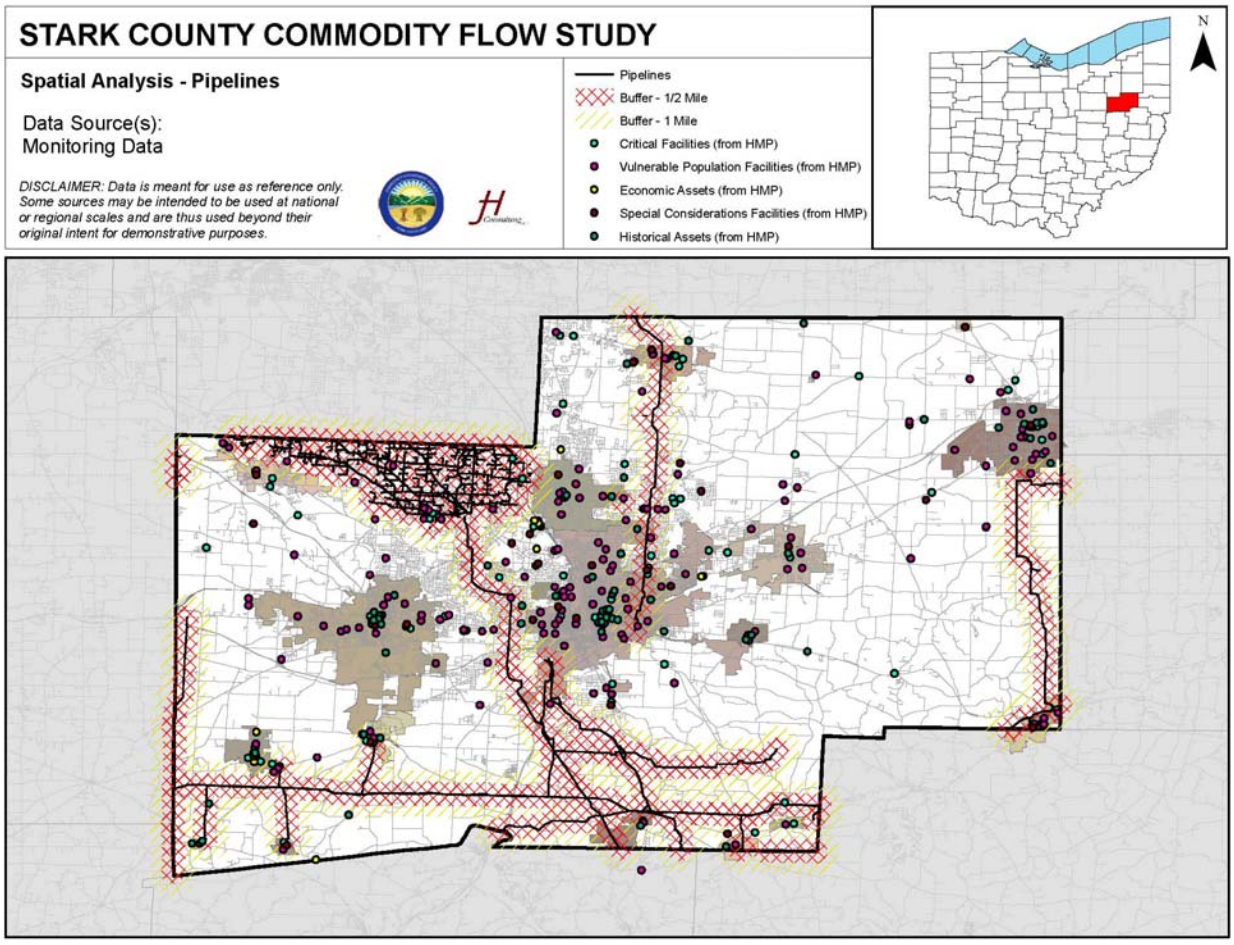


Table 4.3.1 shows the community assets included in the ½-mile buffer area. These assets were taken from the *Stark County 2017 Multi-Jurisdictional Hazard Mitigation Plan* (Stark County EMA, 2017).

Table 4.3.1

Community Assets Located in ½-Mile Isolation Distance from Pipelines

Asset Name	Critical Facility	Vulnerable Population	Economic Asset	Special Consideration	Historical
Alliance Middle School		X			
Altercare of Canton		X			
Bartley Ambulance Service	X				
Beach City Fire Department	X				
Beach City Police Department	X				
Beach City Post Office				X	

Asset Name	Critical Facility	Vulnerable Population	Economic Asset	Special Consideration	Historical
Beldon Elementary School		X			
Bethlehem Township Fire Department	X				
Brewster South Water Tower	X				
Canton Water Treatment Plant	X				
Chapel Hill Community		X			
Dobkins, John and Syd, House					X
East Sparta Elementary School		X			
East Sparta Volunteer Fire Department	X				
Fairless Elementary School		X			
Fairless High School		X			
Fairless Middle School		X			
Gaslite Villa Health Care	X	X			
Gaslite Villa Health Care	X	X			
Gentlebrook Senior Living		X			
Glenoak High School		X			
Hartford Middle School		X			
Hartville Elementary School		X			
Hartville Meadows		X			
Hartville Post Office				X	
Harvard Company-Weber Dental Manufacturing Company					X
Hazen Middle School		X			
Jackson High School		X			
Jackson Local Schools		X			
Jackson Memorial Middle School		X			
Jackson Township Fire Department	X				
Jackson Township Police Department	X				
Lake Cable Elementary School		X			
Lake Elementary School		X			
Loew-Define Grocery Store and Home					X
Magnolia Elementary School		X			
Massillon Fire Department	X				
McIntosh Oil and Gas Storage			X		
McKinley Health Care Center		X			
McKinley, William, Tomb					X
Mercy Stat Care	X	X			
Mercy Stat Care	X	X			
Minerva Elder Care Center		X			
Minerva Fire Department	X				
Minerva High School		X			
Minerva Police Department	X				
Minerva Post Office				X	
Navarre Elementary School		X			
Navarre Police Department	X				
Navarre Post Office				X	
Navarre Village Fire Department	X				
NE Waterworks Post Office				X	
North Canton Water Treatment Plant	X				
Northwest High School		X			
Oakwood Middle School		X			
Plain Township Fire Station One	X				

Asset Name	Critical Facility	Vulnerable Population	Economic Asset	Special Consideration	Historical
Plain Township Fire Station Two	X				
Prairie College Elementary School		X			
Ransom H Barr Elementary School		X			
Sandy Township Fire Department	X				
Sauder Elementary School		X			
Serquet, Emanuel and Frederick, Farm					X
State Police Canton Patrol Post	X				
Strausser Elementary School		X			
Tri-County Emergency Medical Services	X				
Village of Navarre	X				
Washington Middle School		X			
Whipple Heights Elementary School		X			
William S Stinson ES		X			
Wilmot Fire Department	X				
Wilmot Police Department	X				
Wilmot United Brethren Church					X

4.4 Conclusions

Table 4.4.1 presents the materials identified by the pipeline analysis.

Table 4.4.1

Hazardous Materials – Pipeline Analysis

Material Name (and UN Number)	Companies Reporting	Reported Lines
Natural gas (UN 1971)	3	Numerous
Crude oil (UN 1267)	1	1
Natural gas liquids (UN 1965)	1	3
Petroleum products (UN 1268)	2	5

Pipeline analysis data suggests the following conclusions.

- The pipeline analysis contributed four unique hazardous materials to this study. Two of those materials (natural gas and natural gas liquids) only appeared in the pipeline analysis.

5.0 CONCLUSION AND RECOMMENDATIONS

5.1 Conclusions

The following conclusions summarize the transport, use, and storage of hazardous materials in the county.

- This commodity flow study reflects a total of 214 different specifically-named materials.
  - Sixteen (16) materials (7.48%) appeared only in the highway analysis.
  - One hundred sixty eight (168) materials (78.50%) appeared only in the railway analysis.
  - Two materials (0.93%) appeared only in the pipeline analysis.

- This study identified 17 “extremely hazardous substances” (EHS) that require extraordinary planning and response considerations (as part of the total 214).
- In addition to those 214 materials above, the study included a total of nine other placards during the highway analysis that did not have a UN number.
  - Corrosive
  - Dangerous
  - Explosives
  - Flammable gas
  - Flammable liquid
  - Flammable solid
  - Miscellaneous
  - Non-flammable gas
  - Oxidizer

5.2 Recommendations

5.2.1 Continue to update this flow study on a regular basis.

Though its composition has changed, Stark County has seen a steady industrial presence in recent years, as has much of the surrounding region. The amounts and types of hazardous materials utilized and stored may fluctuate as industry changes. For this document to remain an accurate, viable basis for hazardous material planning and training efforts, it should

reflect these continual changes. The document should be updated every three to five years.

5.2.2 Vary data collection times throughout a calendar year.

The railway and pipeline data in this study represent 12-month periods. However, the study only captured highway data for a one-week period in the spring of the year. Intuitively, it seems natural to assume that shipping patterns could vary throughout a year. As planners update this study, they should make an effort to vary data collection times to show shipping trends.

5.2.3 Ensure that responders receive training in response to incidents involving flammable liquid, gas, and corrosive products.

In general, these types of materials are the frequently-transported products in the county (as part of Classes 2, 3, and 8). As such, they are the hazardous materials most likely to be involved in an incident. Responders should seek training to prepare themselves for such an incident properly.

5.2.4 Ensure that responders receive training in the response involving the 17 EHS materials reported in the study.

The U.S. EPA designated a list of materials as “extremely hazardous” because they require additional response measures to ensure public safety (and to protect the personnel responding to the incident). These study identified 17 EHS materials in the highway and railway analyses. Consequently, they are the EHS materials most likely to be involved in an incident and responders should thus properly prepare for their release.

5.2.5 Design emergency exercises that include the materials recorded in this study.

Earlier recommendations in this report call for the need to properly train local responders. A significant aspect of this preparedness is designing realistic exercises involving the materials they are likely to encounter. Training efforts are misspent if involving materials that responders are highly unlikely to see in a local incident.

5.2.6 Encourage Norfolk Southern Railroad (NSRR) and Wheeling & Lake Erie Railway (WLE) representatives to participate in emergency exercises.

Due to the presence of rail transport in Stark County, NSRR or WLE could be critical components of a hazardous material response. As such, their participation in exercises would greatly benefit the coordination that would need to occur between them and local responders during an actual incident.

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APPENDIX 1

HAZARDOUS MATERIALS IN STARK COUNTY

This appendix contains a complete list of all of the hazardous materials identified in Stark County, regardless of phase.

Table A1.1

Materials List (w/ Known Corresponding UN Number)

Hazardous Materials	UN Number	Mode		
		Highway	Rail	Pipeline
Cartridges for weapons	XX12		X	
Cases, cartridge, empty	XX55		X	
Air, compressed	1002		X	
Butadienes, stabilized	1010		X	
Butane	1011		X	
Carbon dioxide	1013		X	
Chlorine	1017		X	
Chlorodifluoromethane	1018		X	
1.1-Difluoroethane	1030		X	
Ethylene oxide	1040		X	
Ethylene oxide & carbon dioxide mixture	1041	X		
Fire extinguishers	1044		X	
*No longer in use	1047	X		
Hydrogen fluoride, anhydrous	1052		X	
Isobutylene	1055		X	
Lighters	1057		X	
Methylamine, anhydrous	1061		X	
Nitrogen, compressed	1066	X		
Oxygen, refrigerated liquid	1073	X		
Butane	1075		X	
Isobutane	1075		X	
LP gases	1075	X	X	
Propane	1075		X	
Propylene	1077		X	
Sulfur dioxide	1079		X	
Vinyl chloride	1086		X	
Acetone	1090		X	
Acrylonitrile, stabilized	1093		X	
Allyl alcohol	1098		X	
Allyl chloride	1100		X	
Amyl acetates	1104		X	
Pentanols	1105		X	
Benzene	1114		X	
Butanols	1120		X	
Butyl acetates	1123		X	
Adhesives	1133		X	
Diacetone alcohol	1148		X	

Hazardous Materials	UN Number	Mode		
		Highway	Rail	Pipeline
Diethyl ether	1155		X	
Diisobutyl ketone	1157		X	
Extracts, aromatic	1169		X	
Ethyl alcohol (Ethanol)	1170	X	X	
Ethyl acetate	1173		X	
Ethyl methyl ketone	1193		X	
Extracts, flavoring	1197		X	
Heating oil, light	1202		X	
Gasoline	1203	X	X	
Heptanes	1206		X	
Hexanes	1208		X	
Printing ink	1210		X	
Isobutanol	1212		X	
Isobutyl acetate	1213	X		
Isopropanol	1219		X	
Isopropyl acetate	1220		X	
Methanol	1230		X	
Methyl acetate	1231		X	
Methyl isobutyl ketone	1245		X	
Methyl methacrylate monomer, stabilized	1247		X	
*No longer in use	1254	X		
Octanes	1262		X	
Paint (or paint-related materials)	1263		X	
Pentanes	1265		X	
Perfumery products	1266		X	
Petroleum crude oil	1267	X	X	X
Petroleum distillates, n.o.s.	1268	X	X	X
N-Propanol	1274		X	
Propionaldehyde	1275		X	
Propylene oxide	1280		X	
Sodium methylate	1289		X	
Toluene	1294	X	X	
Vinyl acetate, stabilized	1301		X	
Xylenes	1307		X	
Flammable solids, organic, n.o.s.	1325		X	
Calcium carbide	1402		X	
Ammonium persulfate	1444		X	
Oxidizing solid, n.o.s.	1479	X		
Potassium nitrate	1486		X	
Sodium chlorate	1495		X	
Sodium nitrate	1498		X	
Dichloromethane	1593		X	
Ethylenediamine	1604		X	
Acetonitrile	1648		X	
Acetic anhydride	1715		X	
Butyl acid phosphate	1718	X		
Caustic alkali liquid, n.o.s.	1719	X		
Benzyl chloride	1738		X	
Corrosive liquids, n.o.s.	1760		X	
Ferrous chloride, solution	1760	X	X	
Fluorosilicic acid	1778		X	

Hazardous Materials	UN Number	Mode		
		Highway	Rail	Pipeline
Formic acid	1779		X	
Hydrochloric acid	1789	X	X	
Hydrofluoric acid	1790	X		
Hypochlorite solutions	1791	X	X	
Phosphoric acid solution	1805		X	
Phosphorus trichloride	1809		X	
Potassium hydroxide, solution	1814		X	
Sodium hydroxide, solution	1824	X	X	
Sulfuric acid	1830	X	X	
Sulfuric acid, spent	1832		X	
Resin solution	1866		X	
*No longer in use (formerly self-lightning cigarettes)	1867	X		
Magnesium	1869		X	
Disinfectants	1903		X	
Ethyl acrylate	1917		X	
Ammonium nitrate	1942		X	
Matches, safety	1944		X	
Aerosols	1950		X	
Argon, refrigerated liquid	1951	X	X	
Compressed gas, n.o.s.	1956		X	
Natural gas liquids	1965			X
Hydrogen, refrigerated liquid	1966	X		
Natural gas (Methane)	1971			X
Nitrogen, refrigerated liquid	1977	X		
Alcohols, n.o.s.	1987	X	X	
Combustible liquids, n.o.s.	1993		X	
Flammable liquids, n.o.s.	1993	X	X	
Fuel oil	1993		X	
Waste	1993		X	
Hydrogen peroxide	2014	X	X	
Hydrazine, aqueous	2030		X	
Nitric acid	2031		X	
Dicyclopentadiene	2048		X	
Styrene monomer, stabilized	2055		X	
Tetrahydrofuran	2056		X	
Tripropylene	2057		X	
Ammonium nitrate-based fertilizer	2067		X	
Cresols, liquid	2076		X	
Toluene diisocyanate	2078		X	
Carbon dioxide, refrigerated liquid	2187	X	X	
Formaldehyde solutions	2209		X	
Polymeric beads	2211		X	
Asbestos	2212	X	X	
Maleic anhydride	2215		X	
Fish meal stabilizer	2216		X	
Acrylic acid, stabilized	2218		X	
Benzotrichloride	2226	X		
N-Methylaniline	2294		X	
Methyl chloroacetate	2295	X		
Isopropenylbenzene	2303	X	X	

Hazardous Materials	UN Number	Mode		
		Highway	Rail	Pipeline
Nephthalene, molten	2304		X	
Phenol, molten	2312		X	
Zinc chloride	2331		X	
Butyl acrylates, stabilized	2348		X	
Ammonium nitrate, liquid	2426		X	
Sulfur, molten	2448	X	X	
Trichloroisocyanuric acid, dry	2468		X	
Ethanolamine	2491		X	
Chemical under pressure	2501		X	
1-Chloro-1,1-Difluoroethane	2517		X	
Methacrylic acid, stabilized	2531		X	
Ferric chloride, solution	2582	X	X	
Vinyltoluenes, stabilized	2618		X	
Sodium chloroacetate	2659		X	
Ammonia solutions	2672		X	
Bisulfites, aqueous	2693		X	
Trifluoroacetic acid	2699		X	
Amines, liquid	2735		X	
2-Ethylhexyl	2748		X	
Acetic acid, glacial	2789		X	
Batteries, wet, filled	2794		X	
Battery fluid, acid	2796		X	
2-Chloropyridine	2822		X	
Propylene tetramer	2850		X	
Furfuryl alcohol	2874		X	
Radioactive material, low, specific activity	2912		X	
Corrosive liquids, toxic, n.o.s.	2922		X	
Corrosive solids, toxic, n.o.s.	2923			
Flammable liquids	2924		X	
Sulfamic acid	2967		X	
Life-saving appliances	2990		X	
Alcoholic beverages	3065		X	
Environmentally hazardous substances, solid, n.o.s.	3077	X	X	
Hazardous waste, solid, n.o.s.	3077		X	
Waste	3077		X	
Environmentally hazardous substances, liquid, n.o.s.	3082	X	X	
Other regulated substances, liquid, n.o.s.	3082		X	
Self-heating solids	3088		X	
1-Methyoxy-2-Propanol	3092		X	
Organic peroxide, type F, liquid	3109	X	X	
Hydrogen peroxide and peroxyacetic acid mixtures, stabilized	3149		X	
1,1,1,2-Tetrafluoroethane	3159		X	
Liquefield gas, flammable, n.o.s.	3161		X	
Engines, internal	3166		X	
Vehicle, flammable liquid	3166		X	
Battery-powered vehicle	3171		X	
Solids containing flammable liquid, n.o.s.	3175		X	
Pentafluoroethane	3220		X	

Hazardous Materials	UN Number	Mode		
		Highway	Rail	Pipeline
Self-reactive solid type C	3224	X		
Self-reactive solid type D	3226	X		
Difluoromethane	3252		X	
Elevated temperature liquid, flammable, n.o.s.	3256		X	
Elevated temperature liquid, n.o.s.	3257	X	X	
Alkyl sulfuric acids	3259		X	
Amines, solid, corrosive, n.o.s.	3259		X	
Corrosive solid, basic, inorganic, n.o.s.	3262		X	
Corrosive liquid, acidic, inorganic, n.o.s.	3267		X	
Corrosive liquid, acidic, organic, n.o.s.	3265	X	X	
Corrosive liquid, basic, inorganic, n.o.s.	3266	X	X	
Corrosive liquid, basic, organic, n.o.s.	3267		X	
Safety devices	3268		X	
Esters, n.o.s.	3272		X	
Toxic solid, inorganic, n.o.s.	3288		X	
Hydrocarbons, liquid, n.o.s.	3295	X	X	
Refrigerant gas r404a	3337		X	
Pyrethroid pesticide	3349		X	
Sodium carbonate	3378		X	
Acrylamide solution	3426		X	
Waste polychlorinated biphenyls, solid	3432		X	
Cresols, solid	3455		X	
Ethanol/gasoline mixture	3475	X	X	
Lithium ion batteries	3481		X	
Petroleum sour crude oil, flammable, toxic	3494		X	
Gasoline	3501		X	
Propylene	3549		X	

***** EHS Materials

Table A1.2

Materials List (w/ Unknown Corresponding UN Number)

Hazardous Materials	Mode		
	Highway	Rail	Pipeline
Freight All Kinds (FAK)-Hazardous materials		X	

Table A1.3

General Placards Observed

Placard	Definition	Mode	
		Highway	Rail
Corrosive	Toxic; inhalation, ingestion, or skin contact may cause severe injury or death.	X	
Dangerous	Produce flammable and toxic gases upon contact with water OR may explode from heat, shock, friction, or contamination.	X	
Explosives	Explosives without a significant blast hazard.	X	
Flammable Liquid	Highly flammable; easily ignited by sparks or flame.	X	
Flammable	Highly flammable; easily ignited by heat, sparks, or flame; may form explosive mixtures with air.	X	
Flammable Solid	Highly flammable; easily ignited by sparks or flame.	X	
Miscellaneous	Generic placard representing Hazard Class 9.	X	
Non-Flammable Gas	Vapors may cause dizziness or asphyxiation without warning; vapors are heavier than air and likely to spread along the ground.	X	
Oxidizer	May explode from friction, heat, or irritation; will accelerate burning when involved in a fire.	X	

APPENDIX 2

HIGHWAY MONITORING SITE DATA

This appendix contains detailed information regarding the monitoring sites observed as part of this project.

- Interstate 77
- State Route (SR) 21 (near Navarre)
- SR 172 and US Route 30 Intersection
- US Route 30 (south of Massillon)
- US Route 62 (North)
- US Route 62 (South)

Where applicable, the site profiles below contain the most recent Ohio Department of Transportation (ODOT) traffic count information (2017) for that highway. The figure presented represents the total traffic through that site in an average 24-hour period. For comparison, planners mathematically estimated the hazardous material figures for each site for 24-hour intervals and then presented an estimated percentage of traffic carrying hazardous materials through a site in an average 24-hour period.

Date: May 21, 2018

Time: 11:00 a.m. **Interval:** 4 hours

US Route 62 (South)

Monitor: Traffic east/west on 62

Weather: 68F, sunny

Special Considerations: N/A

Trucks Carrying Haz-Mat

Trucks may have multiple placards

Trailer Type	*Totals*	*% of Total*
111	5	0.5%
117	4	0.4%
131	10	1.1%
134	0	0.0%
137	8	0.9%
Other	8	0.9%

UN No.	*Class*	*Name*	*Total*	*% of All Placards*
1073	2	Oxygen, ref. liquid	1	2.8%
1075	2	LP gases	1	2.8%
1203	3	Gasoline	6	16.7%
1267	3	Petroleum crude oil	5	13.9%
1789	8	Hydrochloric acid	2	5.6%
1977	2	Nitrogen, ref. liquid	4	11.1%
1993	3	Flammable liquids, n.o.s.	9	25.0%
2187	2	Carbon dioxide, ref. liquid	1	2.8%
3077	9	Env. haz. substance, solid, n.o.s.	1	2.8%
3257	9	Elevated temp. liq., n.o.s.	1	2.8%

General Placards	*Totals*	*% of All Placards*
Corrosive	2	5.6%
Dang When Wet	2	5.6%
Flamm Liquid	1	2.8%

Site Summary Data

Total Haz-Mat:	36
Unique Placards (#):	13
Total Truck Traffic:	927
% w/ Placard:	3.9%
ODOT Count:	43660
24 hr-Trucks Calc:	5562
24-hr Haz Calc:	216
Est Haz per hr:	9
% Haz per 24-hr:	0.5%

Hazard Classes

1-Explosives:	0	0.0%
2-Gases:	7	19.4%
3-Flamm. Liquids:	21	58.3%
4-Flamm. Solids:	2	5.6%
5-Oxidizers:	0	0.0%
6-Toxics:	0	0.0%
7-Radioactives:	0	0.0%
8-Corrosives:	4	11.1%
9-Miscellaneous:	2	5.6%

Date: May 21, 2018

Time: 4:00 p.m. **Interval:** 4 hours

Interstate 77

Monitor: Traffic north/south on 77

Weather: 81F, sunny

Special Considerations: N/A

Trucks Carrying Haz-Mat

Trucks may have multiple placards

Trailer Type	Totals	% of Total
111	7	0.8%
117	9	1.0%
131	46	5.0%
134	0	0.0%
137	16	1.8%
Other	9	1.0%

Site Summary Data

Total Haz-Mat:	80
Unique Placards (#):	26
Total Truck Traffic:	912
% w/ Placard:	8.8%
ODOT Count:	85990
24 hr-Trucks Calc:	5472
24-hr Haz Calc:	480
Est Haz per hr:	20
% Haz per 24-hr:	0.6%

Hazard Classes

1-Explosives:	0	0.0%
2-Gases:	11	13.8%
3-Flamm. Liquids:	54	67.5%
4-Flamm. Solids:	3	3.8%
5-Oxidizers:	1	1.3%
6-Toxics:	0	0.0%
7-Radioactives:	0	0.0%
8-Corrosives:	4	5.0%
9-Miscellaneous:	7	8.8%

UN No.	Class	Name	Total	% of All Placards
1073	2	Oxygen, ref. liquid	2	2.5%
1075	2	LP gases	2	2.5%
1170	3	Ethyl alcohol	1	1.3%
1203	3	Gasoline	34	42.5%
1254	9	*No longer in use	1	1.3%
1267	3	Petroleum crude oil	5	6.3%
1268	3	Petroleum distillates, n.o.s.	3	3.8%
1789	8	Hydrochloric acid	2	2.5%
1951	2	Argon, ref. liquid	1	1.3%
1977	2	Nitrogen, ref. liquid	3	3.8%
1987	3	Alcohols, n.o.s.	1	1.3%
1993	3	Flammable liquids, n.o.s.	3	3.8%
2014	5	Hydrogen peroxide	1	1.3%
2187	2	Carbon dioxide, ref. liquid	1	1.3%
2303	3	Isopropenylbenzene	1	1.3%
3082	9	Env. haz. substance, liq., n.o.s.	1	1.3%
3224	4	Self-reactive solid type C	1	1.3%
3257	9	Elevated temp. liq., n.o.s.	4	5.0%
3295	3	Hydrocarbons, liq., n.o.s.	3	3.8%
3475	3	Ethanol/gasoline mixture	1	1.3%

* According to the U.S. DOT, UN 1254 is no longer in use.

General Placards	Totals	% of All Placards
Corrosive	2	2.5%
Dangerous	1	1.3%
Dang When Wet	2	2.5%
Flamm Gas	1	1.3%
Flamm Liquid	2	2.5%
Non-Flamm Gas	1	1.3%

Date: May 22, 2018

Time: 6:00 a.m. ***Interval:*** 4 hours

Interstate 77

Monitor: Traffic north/south on 77

Weather: 65F, cloudy and wet

Special Considerations: N/A

Trucks Carrying Haz-Mat

Trucks may have multiple placards

Trailer Type	*Totals*	*% of Total*
111	6	0.4%
117	10	0.7%
131	38	2.6%
134	0	0.0%
137	43	2.9%
Other	14	0.9%

Site Summary Data	
Total Haz-Mat:	111
Unique Placards (#):	29
Total Truck Traffic:	1487
% w/ Placard:	7.5%
ODOT Count:	85990
24 hr-Trucks Calc:	8922
24-hr Haz Calc:	666
Est Haz per hr:	28
% Haz per 24-hr:	0.8%

Hazard Classes		
1-Explosives:	0	0.0%
2-Gases:	11	9.9%
3-Flamm. Liquids:	59	53.2%
4-Flamm. Solids:	1	0.9%
5-Oxidizers:	1	0.9%
6-Toxics:	1	0.9%
7-Radioactives:	0	0.0%
8-Corrosives:	14	12.6%
9-Miscellaneous:	24	21.6%

UN No.	*Class*	*Name*	*Total*	*% of All Placards*
1041	2	Ethylene oxide & CO2 mix.	1	0.9%
1047	2	*No longer in use	1	0.9%
1073	2	Oxygen, ref. liquid	6	5.4%
1075	2	LP gases	2	1.8%
1203	3	Gasoline	36	32.4%
1267	3	Petroleum crude oil	5	4.5%
1268	3	Petroleum distillates, n.o.s.	4	3.6%
1294	3	Toluene	1	0.9%
1718	8	Butyl acid phosphate	1	0.9%
1719	8	Caustic alkali liq., n.o.s.	1	0.9%
1760	8	Ferrous chloride, sol.	1	0.9%
1789	8	Hydrochloric acid	2	1.8%
1791	8	Hypochlorite solutions	4	3.6%
1824	8	Sodium hydroxide, sol.	2	1.8%
1867	3	**No longer in use	1	0.9%
1966	2	Hydrogen, ref. liquid	1	0.9%
1987	3	Alcohols, n.o.s.	1	0.9%
1993	3	Flammable liquids, n.o.s.	9	8.1%
2014	5	Hydrogen peroxide	1	0.9%
2212	9	Asbestos	1	0.9%
2295	6	Methyl Chloroacetate	1	0.9%
2582	8	Ferric chloride, sol.	1	0.9%
3077	9	Env. haz. substance, solid, n.o.s.	2	1.8%
3082	9	Env. haz. substance, liquid, n.o.s.	1	0.9%
3226	4	Self-reactive solid type D	1	0.9%
3257	9	Elevated temp. liq., n.o.s.	18	16.2%
3265	8	Corrosive liq., acidic, organic, n.o.s.	2	1.8%
3295	3	Hydrocarbons, liq., n.o.s.	2	1.8%

General Placards	*Totals*	*% of All Placards*
Miscellaneous	2	1.8%

* According to the U.S. DOT, UN 1047 is no longer in use.

** According to the U.S. DOT, UN 1867 is no longer in use. It was formerly used to identify self-lighting cigarettes.

Date: May 22, 2018

Time: 11:00 a.m. **Interval:** 3 hours

US Route 30 (south of Massillon)

Monitor: Traffic east/west on 30

Weather: 70F, cloudy

Special Considerations: N/A

Trucks Carrying Haz-Mat

Trucks may have multiple placards

Trailer Type	Totals	% of Total
111	0	0.0%
117	3	0.4%
131	14	1.7%
134	0	0.0%
137	15	1.8%
Other	5	0.6%

UN No.	Class	Name	Total	% of All Placards
1203	3	Gasoline	11	29.7%
1213	3	Isobutyl acetate	1	2.7%
1267	3	Petroleum crude oil	1	2.7%
1791	8	Hypochlorite solutions	1	2.7%
1951	2	Argon, ref. liquid	2	5.4%
1977	2	Nitrogen, ref. liquid	1	2.7%
1987	3	Alcohols, n.o.s.	5	13.5%
1993	3	Flammable liquids, n.o.s.	8	21.6%
3257	9	Elevated temp. liq., n.o.s.	7	18.9%

General Placards	Totals	% of All Placards

Site Summary Data

Total Haz-Mat:	37
Unique Placards (#):	9
Total Truck Traffic:	818
% w/ Placard:	4.5%
ODOT Count:	31027
24 hr-Trucks Calc:	6544
24-hr Haz Calc:	296
Est Haz per hr:	12
% Haz per 24-hr:	1.0%

Hazard Classes

1-Explosives:	0	0.0%
2-Gases:	3	8.1%
3-Flamm. Liquids:	26	70.3%
4-Flamm. Solids:	0	0.0%
5-Oxidizers:	0	0.0%
6-Toxics:	0	0.0%
7-Radioactives:	0	0.0%
8-Corrosives:	1	2.7%
9-Miscellaneous:	7	18.9%

Date: May 22, 2018

Time: 3:00 p.m. **Interval:** 4 hours

State Route 21 (near Navarre)

Monitor: Traffic north/south on 21

Weather: 78F, cloudy

Special Considerations: N/A

Trucks Carrying Haz-Mat

Trucks may have multiple placards

Trailer Type	Totals	% of Total
111	0	0.0%
117	0	0.0%
131	0	0.0%
134	0	0.0%
137	1	0.3%
Other	1	0.3%

UN No.	Class	Name	Total	% of All Placards
1789	8	Hydrochloric acid	1	50.0%
1993	3	Flammable liquids, n.o.s.	1	50.0%

General Placards	Totals	% of All Placards

Site Summary Data

Total Haz-Mat:	2
Unique Placards (#):	2
Total Truck Traffic:	364
% w/ Placard:	0.5%
ODOT Count:	18630
24 hr-Trucks Calc:	2184
24-hr Haz Calc:	12
Est Haz per hr:	1
% Haz per 24-hr:	0.1%

Hazard Classes

1-Explosives:	0	0.0%
2-Gases:	0	0.0%
3-Flamm. Liquids:	1	50.0%
4-Flamm. Solids:	0	0.0%
5-Oxidizers:	0	0.0%
6-Toxics:	0	0.0%
7-Radioactives:	0	0.0%
8-Corrosives:	1	50.0%
9-Miscellaneous:	0	0.0%

Date: May 23, 2018

Time: 6:00 a.m. ***Interval:*** 4 hours

US Route 62 (North)

Monitor: Traffic east/west on 62

Weather: 59F, cloudy

Special Considerations: N/A

Trucks Carrying Haz-Mat

Trucks may have multiple placards

Trailer Type	*Totals*	*% of Total*
111	2	0.5%
117	0	0.0%
131	4	1.1%
134	0	0.0%
137	4	1.1%
Other	4	1.1%

UN No.	*Class*	*Name*	*Total*	*% of All Placards*
1203	3	Gasoline	5	35.7%
1267	3	Petroleum crude oil	1	7.1%
1791	8	Hypochlorite solutions	1	7.1%
1993	3	Flammable liquids, n.o.s.	1	7.1%
2187	2	Carbon dioxide, ref. liquid	1	7.1%
2226	8	Benzotrichloride	1	7.1%
3257	9	Elevated temp. liq., n.o.s.	1	7.1%
3295	3	Hydrocarbons, liq., n.o.s.	1	7.1%

General Placards	*Totals*	*% of All Placards*
Flamm Liquid	1	7.1%
Miscellaneous	1	7.1%

Site Summary Data

Total Haz-Mat:	14
Unique Placards (#):	10
Total Truck Traffic:	371
% w/ Placard:	3.8%
ODOT Count:	28360
24 hr-Trucks Calc:	2226
24-hr Haz Calc:	84
Est Haz per hr:	4
% Haz per 24-hr:	0.3%

Hazard Classes

1-Explosives:	0	0.0%
2-Gases:	1	7.1%
3-Flamm. Liquids:	9	64.3%
4-Flamm. Solids:	0	0.0%
5-Oxidizers:	0	0.0%
6-Toxics:	0	0.0%
7-Radioactives:	0	0.0%
8-Corrosives:	2	14.3%
9-Miscellaneous:	2	14.3%

Date: May 23, 2018

Time: 11:00 a.m. **Interval:** 3 hours

State Route 172 and US Route 30

Monitor: Traffic in all directions, both routes

Weather: 61F, cloudy

Special Considerations: N/A

Trucks Carrying Haz-Mat

Trucks may have multiple placards

Trailer Type	Totals	% of Total
111	0	0.0%
117	1	0.3%
131	12	3.1%
134	0	0.0%
137	9	2.3%
Other	5	1.3%

UN No.	Class	Name	Total	% of All Placards
1073	2	Oxygen, ref. liquid	1	3.4%
1075	2	LP gases	1	3.4%
1203	3	Gasoline	7	24.1%
1790	8	Hydrofluoric acid	1	3.4%
1830	8	Sulfuric acid	2	6.9%
1987	3	Alcohols, n.o.s.	1	3.4%
1993	3	Flammable liquids, n.o.s.	6	20.7%
3257	9	Elevated temp. liq., n.o.s.	6	20.7%

General Placards	Totals	% of All Placards
Corrosive	1	3.4%
Flamm Gas	1	3.4%
Non-Flamm Gas	1	3.4%
Oxidizer	1	3.4%

Site Summary Data

Total Haz-Mat:	29
Unique Placards (#):	12
Total Truck Traffic:	383
% w/ Placard:	7.6%
ODOT Count:	9953
24 hr-Trucks Calc:	3064
24-hr Haz Calc:	232
Est Haz per hr:	10
% Haz per 24-hr:	2.3%

Hazard Classes

1-Explosives:	0	0.0%
2-Gases:	4	13.8%
3-Flamm. Liquids:	14	48.3%
4-Flamm. Solids:	0	0.0%
5-Oxidizers:	1	3.4%
6-Toxics:	0	0.0%
7-Radioactives:	0	0.0%
8-Corrosives:	4	13.8%
9-Miscellaneous:	6	20.7%

Date: May 23, 2018

Time: 3:00 p.m. **Interval:** 4 hours

US Route 30 (south of Massillon)

Monitor: Traffic east/west on 30

Weather: 69F, sunny

Special Considerations: N/A

Trucks Carrying Haz-Mat

Trucks may have multiple placards

Trailer Type	Totals	% of Total
111	1	0.1%
117	6	0.7%
131	35	4.3%
134	0	0.0%
137	7	0.9%
Other	6	0.7%

Site Summary Data

Total Haz-Mat:	55
Unique Placards (#):	11
Total Truck Traffic:	814
% w/ Placard:	6.8%
ODOT Count:	31027
24 hr-Trucks Calc:	4884
24-hr Haz Calc:	330
Est Haz per hr:	14
% Haz per 24-hr:	1.1%

Hazard Classes

1-Explosives:	0	0.0%
2-Gases:	5	9.1%
3-Flamm. Liquids:	42	76.4%
4-Flamm. Solids:	1	1.8%
5-Oxidizers:	1	1.8%
6-Toxics:	0	0.0%
7-Radioactives:	0	0.0%
8-Corrosives:	0	0.0%
9-Miscellaneous:	6	10.9%

UN No.	Class	Name	Total	% of All Placards
1203	3	Gasoline	31	56.4%
1267	3	Petroleum crude oil	3	5.5%
1951	2	Argon, ref. liquid	2	3.6%
1977	2	Nitrogen, ref. liquid	2	3.6%
1987	3	Alcohols, n.o.s.	3	5.5%
1993	3	Flammable liquids, n.o.s.	5	9.1%
2187	2	Carbon dioxide, ref. liquid	1	1.8%
3109	5	Organic peroxide type F, liq.	1	1.8%
3257	9	Elevated temp. liq., n.o.s.	4	7.3%

General Placards	Totals	% of All Placards
Dang When Wet	1	1.8%
Miscellaneous	2	3.6%

Date: May 24, 2018

Time: 8:00 a.m. **Interval:** 3 hours

State Route 21 (near Navarre)

Monitor: Traffic north/south on 21

Weather: 55F, sunny

Special Considerations: N/A

Trucks Carrying Haz-Mat

Trucks may have multiple placards

Trailer Type	*Totals*	*% of Total*
111	1	0.3%
117	0	0.0%
131	1	0.3%
134	0	0.0%
137	2	0.5%
Other	3	0.8%

UN No.	*Class*	*Name*	*Total*	*% of All Placards*
1203	3	Gasoline	1	11.1%
1993	3	Flammable liquids, n.o.s.	1	11.1%
3257	9	Elevated temp. liq., n.o.s.	1	11.1%
3266	8	Corrosive liq., basic, inorganic, n.o.s.	1	11.1%

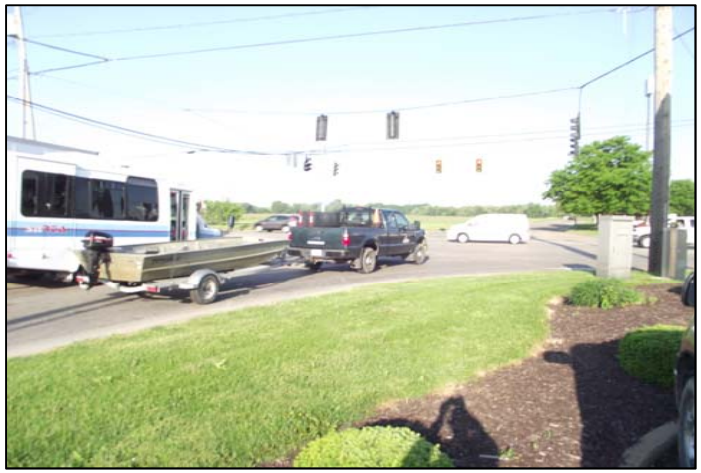
General Placards	*Totals*	*% of All Placards*
Dang When Wet	1	11.1%
Flamm Gas	2	22.2%
Non-Flamm Gas	2	22.2%

Site Summary Data

Total Haz-Mat:	9
Unique Placards (#):	7
Total Truck Traffic:	365
% w/ Placard:	2.5%
ODOT Count:	18630
24 hr-Trucks Calc:	2920
24-hr Haz Calc:	72
Est Haz per hr:	3
% Haz per 24-hr:	0.4%

Hazard Classes

1-Explosives:	0	0.0%
2-Gases:	4	44.4%
3-Flamm. Liquids:	2	22.2%
4-Flamm. Solids:	1	11.1%
5-Oxidizers:	0	0.0%
6-Toxics:	0	0.0%
7-Radioactives:	0	0.0%
8-Corrosives:	1	11.1%
9-Miscellaneous:	1	11.1%



Date: May 24, 2018

Time: 12:00 p.m. **Interval:** 4 hours

State Route 172 and US Route 30

Monitor: Traffic all directions, both routes

Weather: 74F, sunny

Special Considerations: N/A

Trucks Carrying Haz-Mat

Trucks may have multiple placards

Trailer Type	Totals	% of Total
111	0	0.0%
117	4	0.8%
131	6	1.2%
134	0	0.0%
137	18	3.5%
Other	14	2.7%

Site Summary Data

Total Haz-Mat:	43
Unique Placards (#):	18
Total Truck Traffic:	516
% w/ Placard:	8.3%
ODOT Count:	9953
24 hr-Trucks Calc:	3096
24-hr Haz Calc:	258
Est Haz per hr:	11
% Haz per 24-hr:	2.6%

Hazard Classes

1-Explosives:	2	4.7%
2-Gases:	6	14.0%
3-Flamm. Liquids:	20	46.5%
4-Flamm. Solids:	0	0.0%
5-Oxidizers:	1	2.3%
6-Toxics:	0	0.0%
7-Radioactives:	0	0.0%
8-Corrosives:	2	4.7%
9-Miscellaneous:	12	27.9%

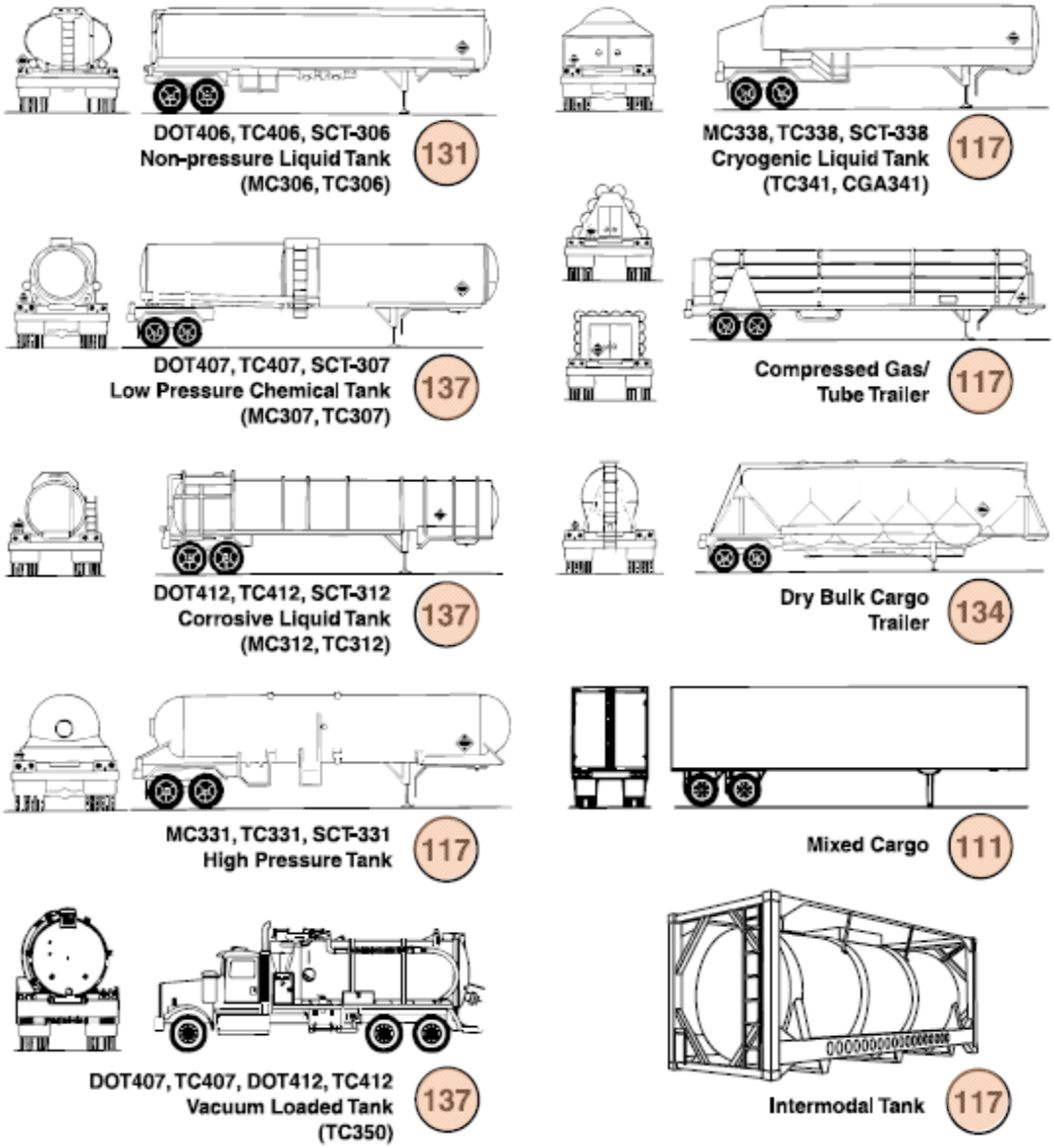
UN No.	Class	Name	Total	% of All Placards
1066	2	Nitrogen, compressed	1	2.3%
1073	2	Oxygen, ref. liquid	2	4.7%
1203	3	Gasoline	4	9.3%
1267	3	Petroleum crude oil	3	7.0%
1268	3	Petroleum distillates, n.o.s.	3	7.0%
1479	5	Oxidizing solid, n.o.s.	1	2.3%
1790	8	Hydrofluoric acid	1	2.3%
1791	8	Hypochlorite solutions	1	2.3%
1993	3	Flammable liquids, n.o.s.	9	20.9%
2187	2	Carbon dioxide, ref. liquid	1	2.3%
2448	9	Sulfur, molten	1	2.3%
3077	9	Env. haz. substance, solid, n.o.s.	1	2.3%
3257	9	Elevated temp. liq., n.o.s.	9	20.9%
3295	3	Hydrocarbons, liq., n.o.s.	1	2.3%

General Placards	Totals	% of All Placards
Explosives	2	4.7%
Flamm Gas	1	2.3%
Miscellaneous	1	2.3%
Non-Flamm Gas	1	2.3%

APPENDIX 3

TRAILER TYPE REFERENCE SHEET

This appendix contains the reference sheet used for determining trailer types during highway field reconnaissance.



APPENDIX 4
RAILWAY DATA REQUESTS

This appendix contains copies of data requests submitted to CSX Transportation and Norfolk Southern Railroad as part of this project. The LEPC also submitted requests to Wheeling & Lake Erie Railway and Genesee & Wyoming Railroad. Both of those requests were letters.

REQUEST FOR HAZARDOUS MATERIALS DENSITY STUDY

Organization Requesting Density Study: Stark County LEPC

Contact Person: Douglas Wood

Phone Number: 330-451-3907

Email Address: dewood@starkcountyohio.gov

Mailing Address: 4500 Atlantic Boulevard, NE (Lower Level)
(Street Address)
Canton, OH 44705
(City, State, Zip)

Geographical Description of Area for study: Stark County, Ohio

By signing below, I acknowledge and agree to the terms set forth by CSX Transportation, Inc. for use and dissemination of the information contained within the CSXT Hazardous Materials Density Study. I affirm that the information provided by CSXT in this report will be used solely for and by bonafide emergency planning and response organizations for the expressed purpose of emergency and contingency planning. This information will not be distributed publicly in whole or in part without the expressed written permission of CSX Transportation, Inc.

(Signature of person requesting density study)

Return Completed Form to:	CSXT, Director-Hazardous Material Systems 500 Water Street J-275 Jacksonville, FL 32202 or **Fax 904-245-2867**

For CSXT Use Only

Director, Hazardous Material Systems Approval: ___Yes___ NO Date: _____

Crisis Communication Manager:

Date Request Received: _____

Date Report Generated: _____

Date Report Sent: _____

REQUEST FOR HAZARDOUS MATERIALS COMMODITY FLOW INFORMATION

Organization Requesting Information: Stark County LEPC

Contact Person: Douglas Wood

Phone Number: 330-451-3907

E-Mail Address: dewood@starkcountyohio.gov

Mailing Address: 4500 Atlantic Boulevard, NE (Lower Level)
(Street Address)

Canton, OH 44705
(City, State, Zip)

Geographical Description of Area for Study: Stark County, OH

By signing below, I acknowledge and agree to the terms set forth by Norfolk Southern Railway Company (NSRC) for use and dissemination of the NSRC Hazardous Materials Commodity Flow Information. NSRC considers this information to be restricted information of a security sensitive nature. I thus affirm and agree that the information provided by NSRC in this report will be used solely for and by bona fide emergency planning and response organizations for the expressed purpose of emergency and contingency planning. This information will not be distributed publicly in whole or in part without the expressed written permission of NSRC.

(Signature of person requesting commodity flow information)

Return Completed Form to:	Norfolk Southern Railway Company Attn: R. Scott Deutsch Regional Manager, Hazardous Materials 425 Holiday Drive Pittsburgh, PA 15220

(For NSRC Use Only)

Initials of person responsible for approval: _____ YES _____ NO Date: _____

Hazardous Materials Service Support:

Date Request Received: _____
Time Period Covered: _____
Date Report Sent: _____
Report sent via: ☐ E-Mail ☐ U.S. Mail

APPENDIX 5
GLOSSARY

This appendix is a glossary of key terms and a list of acronyms used throughout the report. Definitions presented in this appendix may differ slightly from the common definitions of the terms; these definitions correspond to how the term is used (and its meaning) as part of the study.

LIST OF TERMS

Commodity Flow Study: A study to identify the types of hazardous materials transported on a variety of transportation systems (e.g., highway, railway, waterway, airway, pipeline, or at covered facilities).

Covered Facility: A facility that reports to a Local Emergency Planning Committee as part of Tier II reporting requirements under Title III of the Superfund Amendment and Reauthorization Act of 1986.

Covered Facility Analysis: An analysis of the hazardous materials used and stored by covered facilities. The analysis includes an identification of shipping routes, quantities shipped, and frequency of shipments.

Emergency: Any incident, whether natural or human-caused, that requires responsive action to protect life or property. Under the Robert T. Stafford Act, an “emergency” is an incident for which federal assistance is needed to supplement state and local efforts and capabilities to save lives and to protect property.

Extremely Hazardous Substance: A hazardous material recognized by the United States Environmental Protection Agency as having extremely toxic properties and thus necessitates additional safety measures during handling and transport.

Hazard Class: A system utilized by the United States Department of Transportation to classify the type of hazardous material in transport. There are nine (9) hazard classes: Explosives (Class 1), Gases (Class 2), Flammable Liquids (Class 3), Flammable Solids (Class 4), Oxidizers (Class 5), Toxics (Class 6), Radioactive (Class 7), Corrosives (Class 8), and Miscellaneous (Class 9).

Hazardous Material: A material that is (or can be) harmful to human health and the environment.

Highway Analysis: An analysis of hazardous materials transported along roadways in a study area. The analysis is usually completed by visually monitoring select sites along the roadways and recording the hazardous materials that pass through the site. An analysis can also be conducted remotely through the use of waybills, shipping company reporting, etc.

Incident: An occurrence, natural or human-caused, that requires a response to protect life or property.

Placard: A sign or notice for display in a public place. For this document, the sign is the diamond or rectangular-shaped card attached to a truck and trailer labeling hazardous material shipments.

Threshold Planning Quantity: A quantity designated for each chemical on the list of extremely hazardous substances that triggers a notification by facilities to the State Emergency Response Commission that such facilities are subject to emergency planning requirements under SARA Title III.

LIST OF ACRONYMS

DOT	United States Department of Transportation
EHS	Extremely Hazardous Substance
EPCRA	Emergency Planning & Community Right-to-Know Act
FRA	Federal Railroad Administration
JHC	JH Consulting, LLC of West Virginia
LEPC	Local Emergency Planning Committee
NSRR	Norfolk Southern Railroad
ODOT	Ohio Department of Transportation
OH	Ohio
SARA	Superfund Amendment and Reauthorization Act
SERC	State Emergency Response Commission
WLE	Wheeling & Lake Erie Railway