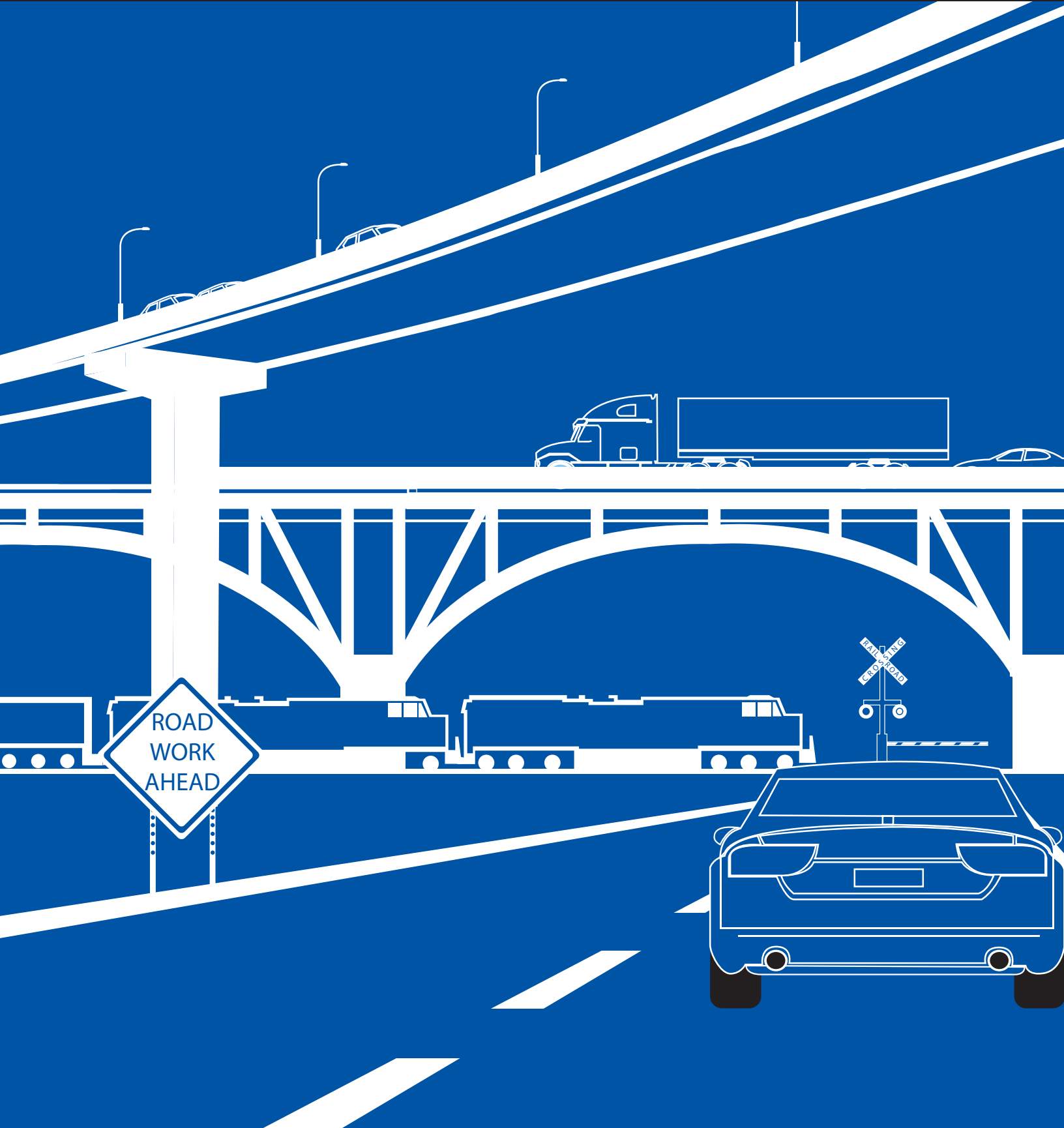




Inventory of Hazardous Materials Shipments Moving into Fayette County, Kentucky

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Kentucky Transportation Center
College of Engineering, University of Kentucky, Lexington, Kentucky

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Commonwealth of Kentucky

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Research Report
KTC-20-27/FLEPC1-1F

Inventory of Hazardous Materials Shipments Moving into Fayette County, Kentucky

Candice Wallace, Ph.D.
Research Scientist

Bryan Gibson, Ph.D.
Program Manager

and

Doug Kreis, Ph.D., P.E.
Associate Director

Kentucky Transportation Center
College of Engineering
University of Kentucky
Lexington, Kentucky

In Cooperation With
Fayette County Local Emergency Planning Committee

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Project Overview and Methodology

Each day, significant quantities of hazardous materials are transported through Fayette County. The bulk of the materials pass through without incident, but some vehicles carrying them are involved in roadway incidents and/or accidents. However, first responders and management personnel lack clear knowledge of what hazardous material commodities are on central Kentucky's roads. This project was designed to provide a high level analysis of hazardous material commodity flows in Fayette County. To accomplish this analysis, Kentucky Transportation Center (KTC) researchers collected data on the flows of inbound hazardous material shipments in Fayette County, Kentucky. Data were collected at six different inbound locations in Fayette County:

- (1) Eastbound I-64 prior to Exit 65 (Midway) in Woodford County,
- (2) I-64 Westbound at the Clark County/Fayette County line,
- (3) I-75 Southbound at the Scott County line,
- (4) I-75 Northbound at the Madison County Line,
- (5) US 60 Eastbound at the Bluegrass Parkway, and
- (6) US 27 Northbound at the Jessamine County Line.

Researchers and members of the Lexington Emergency Planning Commission jointly selected the chosen research sites. Several research teams collected data samples, which were obtained between the hours of 6:00 am and 10:00 pm. During the survey periods, researchers gathered information for all trucks displaying a hazardous material placard. The total truck volume for observation periods was recorded as well. The research team recorded the hazardous material ID number if one was observed. Using the four-digit ID number observed, researchers determined the corresponding hazard class and the appropriate Emergency Response Guide number from the 2016 *Emergency Response Guidebook*.¹ However, not all of the trucks displaying a hazardous material placard have the four-digit ID number visible. This is because markings can vary according to the volume or class of the hazardous material being shipped.² For trucks that had a visible placard but not a four-digit ID number, researchers identified the hazardous material using the 2016 *Emergency Response Guidebook's* Table of Placards and Initial Response Guides to Use On-Scene. This let researchers determine the hazard class and appropriate *Emergency Response Guidebook* number. Data were collected on weekdays (Monday through Friday), whereas observation periods were distributed across different days of the week. On the following pages, Figures 1-5 and Table 1 provide general, overarching takeaways resulting from data collection efforts. Tables 2-13 provide location-specific information for the six observation sites.

Key Findings and Observations

- 515 hazardous material vehicles were observed during the project. Because a vehicle may transport more than one hazardous material at a time, a total of 534 hazardous materials were observed.
- A total of 106 unique hazardous materials were observed.

¹ 2016 Emergency Response Guidebook (<https://www.phmsa.dot.gov/sites/phmsa.dot.gov/files/docs/ERG2016.pdf>)

² U.S. Department of Transportation. 2003. "The Role of Hazardous Material Placards in Transportation Safety and Security." Washington, DC.: U.S. Department of Transportation Research and Special Programs Administration Office of Hazardous Materials Safety.

- The highest average number of vehicles carrying hazardous material was observed during the 12:00 pm – 1:00 pm period.
- Most of the hazardous materials flowing through Fayette County were observed on northbound I-75 (29 percent) followed closely by southbound I-75 (27 percent).
- 50 percent of the hazardous material observations were Class 3 hazardous materials.
- The most common hazardous material observed was Hazardous Material ID Number 1203 (commonly known as gasohol, gasoline, motor spirit, or petrol).

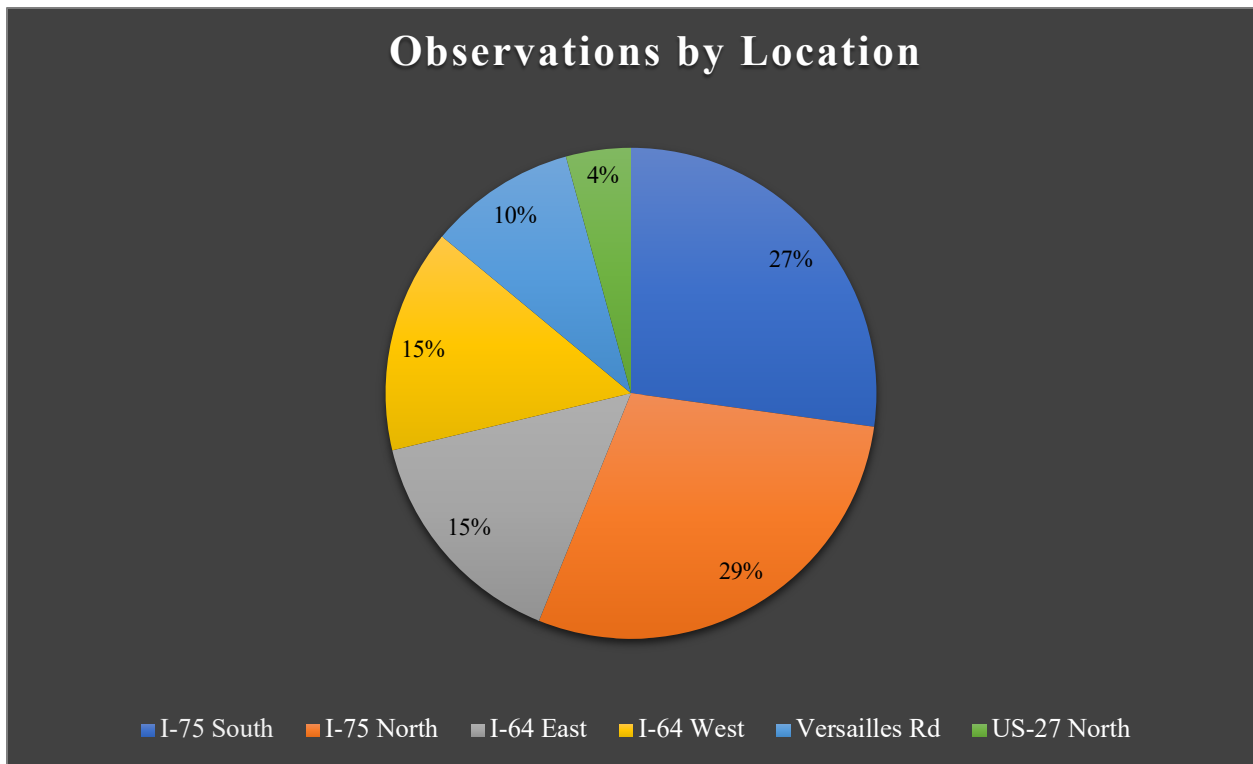


Figure 1: Hazardous Materials by Location (Percentage)

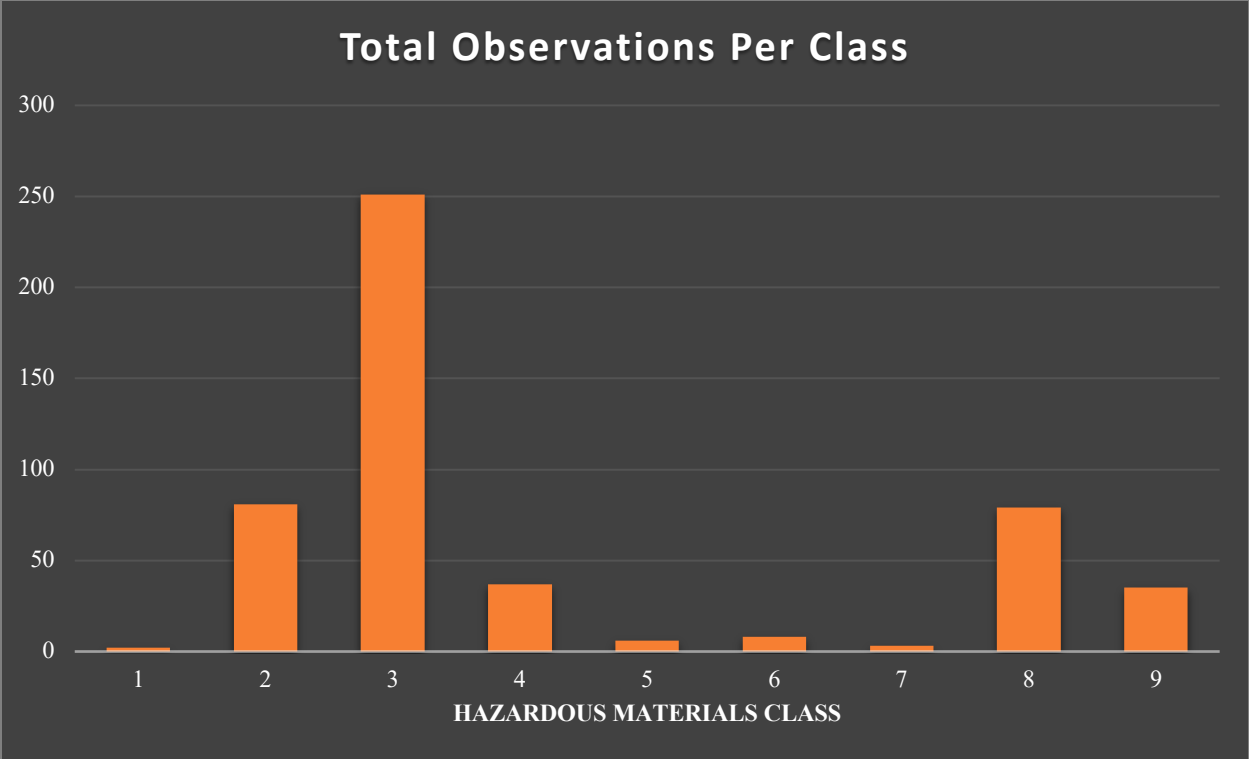


Figure 2: Number of Observations Within Each Hazardous Material Class

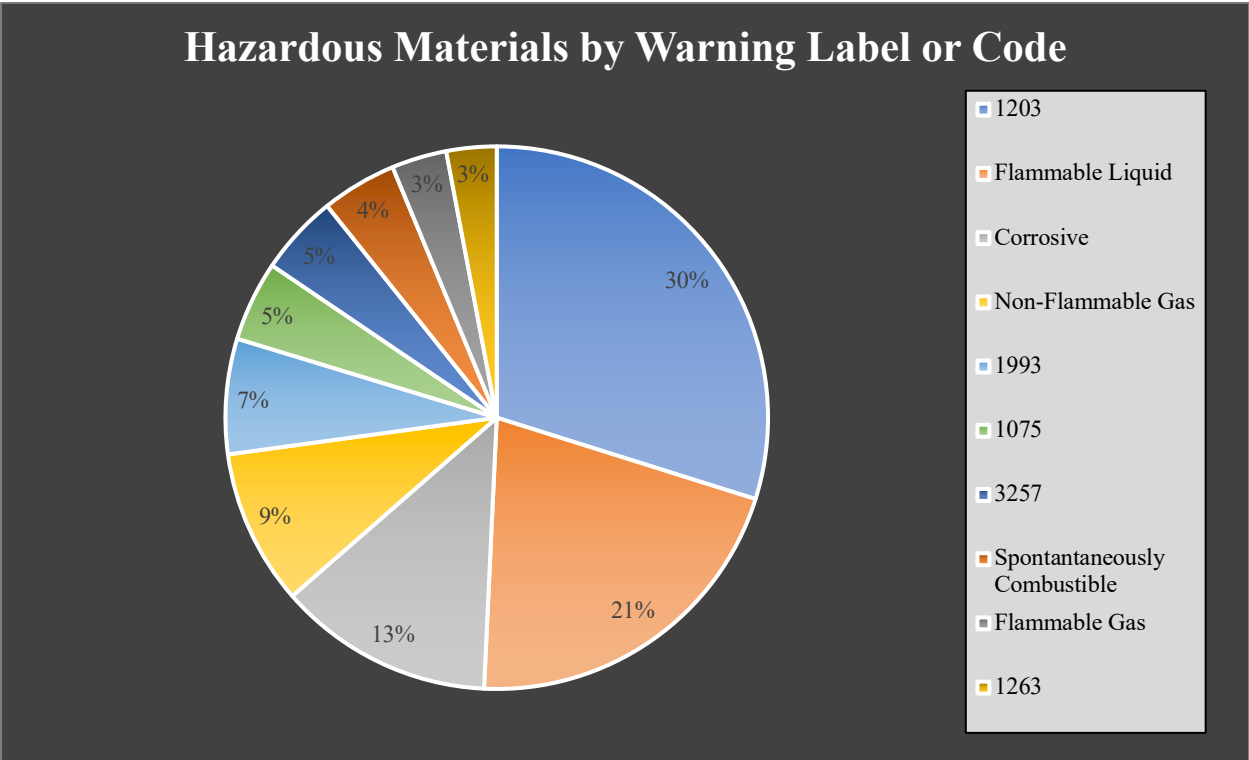


Figure 3: Percentage of Hazardous Materials Shipments Bearing Different Warning Labels or Codes

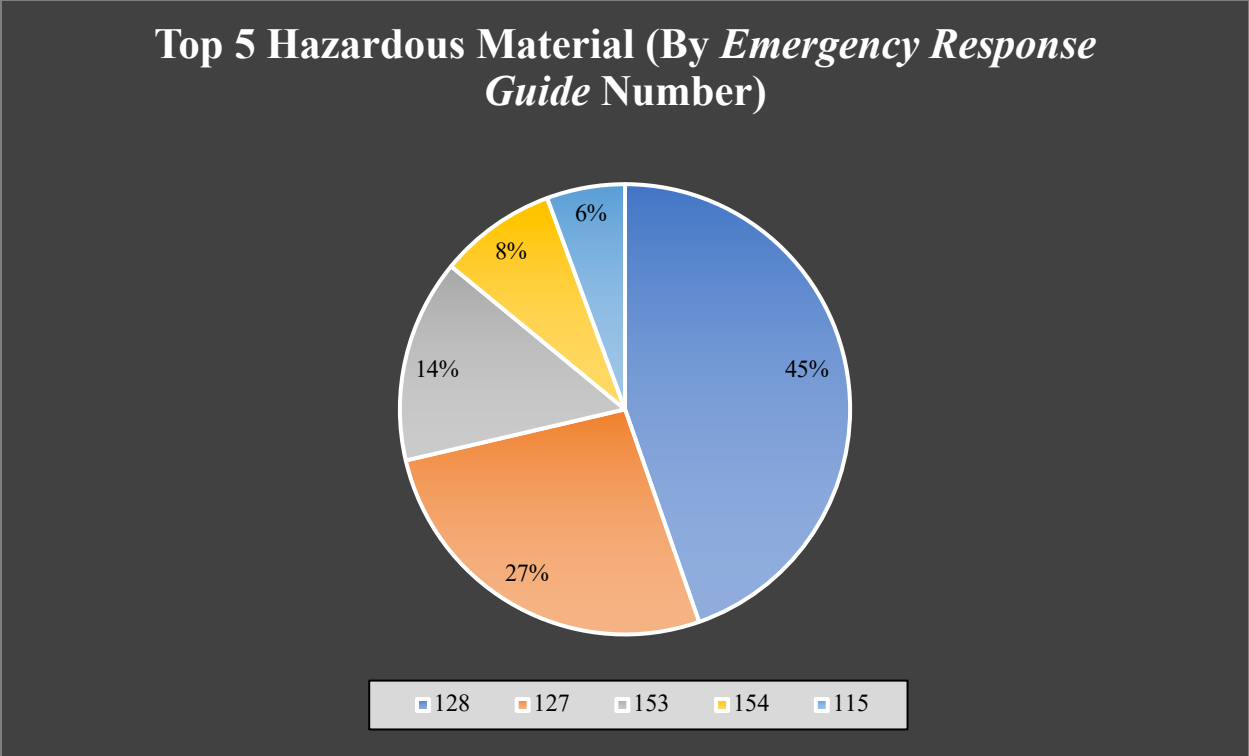


Figure 4: Top 5 Hazardous Materials by *Emergency Response Guide Number*

Interstate 75 Northbound

Data for northbound I-75 were collected between mile marker 98 and mile marker 99. Table 1 summarizes information for this road segment. It lists the number of trucks observed carrying hazardous materials, total number of trucks observed (i.e., inclusive of those carrying hazardous materials and those not transporting hazardous materials), and the percentage of trucks carrying hazardous materials during the observation period. Table 2 lists the most frequently observed hazardous materials recorded on northbound I-75.

Table 1: Northbound I-75 Observations

Location	Observation Period	Number of Trucks Carrying Hazardous Materials	Total Number of Trucks	Percentage of Trucks Carrying Hazardous Materials
I-75 North	6:00 am – 9:00 am	26	724	3.59%
I-75 North	9:00 am – 11:00am	18	515	3.50%
I-75 North	11:00 am – 1:00 pm	27	615	4.39%
I-75 North	1:00 pm – 3:00 pm	21	496	4.23%
I-75 North	3:00 pm – 7:00 pm	45	1,106	4.07%
I-75 North	7:00 pm – 10:00 pm	12	802	1.50%
Totals		149	4,258	3.50%

Table 2: Hazardous Materials Most Frequently Observed on Northbound I-75

Location	Hazardous Material #/ Response Guide #	Hazardous Material Description	Number of Observations
I-75 North	127	Class 3: Flammable Liquid	31
I-75 North	1203	Gasohol, Gasoline, Motor Spirit, Petrol.	29
I-75 North	153	Class 8: Corrosive	17
I-75 North	121	Class 2: Non-Flammable Gas	10
I-75 North	3257	Elevated temperature liquid, n.o.s., at or above 100°C (212°F), and below its flash point	9
I-75 North	136	Class 4: Spontaneously Combustible	7

Interstate 75 Southbound

Data for southbound I-75 were collected at mile marker 119. Table 3 summarizes information for this road segment. It lists the number of trucks observed carrying hazardous materials, total number of trucks observed (i.e., inclusive of those carrying hazardous materials and those not transporting

hazardous materials), and the percentage of trucks carrying hazardous materials during the observation period. Table 4 lists the most frequently observed hazardous materials recorded on southbound I-75.

Table 3: Southbound I-75 Observations

Location	Observation Period	Number of Trucks Carrying Hazardous Materials	Total Number of Trucks	Percentage of Trucks Carrying Hazardous Materials
I-75 South	6:00 am – 9:00 am	28	727	3.85%
I-75 South	9:00 am – 11:00 am	31	625	4.96%
I-75 South	11:00 am – 1:00 pm	19	586	3.24%
I-75 South	1:00 pm – 3:00 pm	16	523	3.06%
I-75 South	3:00 pm – 5:00 pm	26	654	3.98%
I-75 South	5:00 pm – 7:00 pm	13	394	3.30%
I-75 South	7:00 pm – 10:00 pm	7	461	1.52%
Total		140	3,970	3.53%

Table 4: Hazardous Materials Most Frequently Observed on Southbound I-75

Location	Hazardous Material #/ Response Guide #	Hazardous Material Description	Number of Observations
I-75 South	1203	Gasohol, Gasoline, Motor Spirit, Petrol.	24
I-75 South	127	Class 3: Flammable Liquid	15
I-75 South	153	Class 8: Corrosive	14
I-75 South	1987	Alcohols, n.o.s.; Denatured alcohol	9
I-75 South	1993	Combustible Liquid, n.o.s., Compound tree or weed killing, liquid (flammable), Cosmetics, n.o.s., Diesel fuel, Disinfectant Liquid, n.o.s., Drugs, n.o.s., Ethyl nitrate, Flammable liquid, n.o.s., Fuel oil, Heater for refrigerator car, liquid fuel type, Medicines, flammable, liquid, n.o.s., Refrigerating machine.	9
I-75 South	136	Class 4: Spontaneously Combustible	7

Interstate 64 Eastbound

Data for eastbound I-64 were collected between mile marker 83 and mile marker 84. Table 5 summarizes information for this road segment. It lists the number of trucks observed carrying hazardous materials, total number of trucks observed (i.e., inclusive of those carrying hazardous materials and those not transporting hazardous materials), and the percentage of trucks carrying hazardous materials during the observation period. Table 6 lists the most frequently observed hazardous materials recorded on eastbound I-64.

Table 5: Eastbound I-64 Observations

Location	Observation Period	Number of Trucks Carrying Hazardous Materials	Total Number of Trucks	Percentage of Trucks Carrying Hazardous Materials
I-64 East	6:00 am – 9:00 am	13	321	4.05%
I-64 East	9:00 am – 12:00 am	18	343	5.25%
I-64 East	12:00 am – 2:00 pm	9	33	2.73%
I-64 East	2:00 pm – 4:00 pm	8	497	1.61%
I-64 East	4:00 pm – 7:00 pm	17	468	3.63%
I-64 East	7:00 pm – 10:00 pm	13	331	3.93%
Total		78	2,290	3.40%

Table 6: Hazardous Materials Most Frequently Observed on Eastbound I-64

Location	Hazardous Material #/ Response Guide #	Hazardous Material Description	Number of Observations
I-64 East	153	Class 8: Corrosive	10
I-64 East	127	Class 3: Flammable Liquid	10
I-64 East	1203	Gasohol, Gasoline, Motor Spirit, Petrol.	9
I-64 East	1075	Petroleum gases, liquefied or Liquefied petroleum gas	5
I-64 East	121	Class 2: Non-Flammable Gas	5
I-64 East	1993	Combustible Liquid, n.o.s., Compound tree or weed killing, liquid (flammable), Cosmetics, n.o.s., Diesel fuel, Disinfectant Liquid, n.o.s., Drugs, n.o.s., Ethyl nitrate, Flammable liquid, n.o.s., Fuel oil, Heater for refrigerator car, liquid fuel type, Medicines, flammable, liquid, n.o.s., Refrigerating machine.	4

Interstate 64 Westbound

Data for westbound I-64 were collected between mile marker 71 and mile marker 72. Table 7 summarizes information for this road segment. It lists the number of trucks observed carrying hazardous materials, total number of trucks observed (i.e., inclusive of those carrying hazardous materials and those not transporting hazardous materials), and the percentage of trucks carrying hazardous materials during the observation period. Table 8 lists the most frequently observed hazardous materials recorded on westbound I-64.

Table 7: Westbound I-64 Observations

Location	Observation Period	Number of Trucks Carrying Hazardous Materials	Total Number of Trucks	Percentage of Trucks Carrying Hazardous Materials
I-64 West	6:00 am – 10:00 am	8	137	5.84%
I-64 West	10:00 am – 12:00 am	12	325	3.69%
I-64 West	12:00 am – 2:00 pm	13	262	4.96%
I-64 West	2:00 pm – 4:00 pm	18	333	5.41%
I-64 West	4:00 pm – 6:00 pm	11	257	4.33%
I-64 West	6:00 pm – 10:00 pm	14	195	7.18%
Total		76	1,506	5.04%

Table 8: Hazardous Materials Most Frequently Observed on Westbound I-64

Location	Hazardous Material #/ Response Guide #	Hazardous Material Description	Number of Observations
I-64 West	1203	Gasohol, Gasoline, Motor Spirit, Petrol.	14
I-64 West	127	Class 3: Flammable Liquid	10
I-64 West	121	Class 2: Non-Flammable Gas	6
I-64 West	118	Class 2: Flammable Gas	6
I-64 West	1863	Fuel, aviation, turbine engine	4
I-64 West	2187	Carbon dioxide, refrigerated liquid	4

Inbound US 60 (Versailles Road)

Data for inbound US 60 were collected at the border of Woodford County and Fayette County. Table 9 summarizes information for this road segment. It lists the number of trucks observed carrying hazardous materials, total number of trucks observed (i.e., inclusive of those carrying hazardous materials and those not transporting hazardous materials), and the percentage of trucks carrying hazardous materials during the observation period. Table 10 lists the most frequently observed hazardous materials recorded on inbound US 60.

Table 9: Inbound US 60 Observations

Location	Observation Period	Number of Trucks Carrying Hazardous Materials	Total Number of Trucks	Percentage of Trucks Carrying Hazardous Materials
US 60	6:00 am – 9:00 am	7	197	3.55%
US 60	9:00 am – 11:00 am	2	207	0.97%
US 60	11:00 am – 1:00 pm	12	187	6.42%
US 60	1:00 pm – 2:00 pm	4	98	4.08%
US 60	2:00 pm – 4:00 pm	7	147	4.76%
US 60	4:00 pm – 6:00 pm	10	144	6.94%
US 60	6:00 pm – 10:00 pm	8	208	3.85%
Total		50	1,188	4.21%

Table 10: Hazardous Materials Most Frequently Observed on Inbound US 60

Location	Hazardous Material #/ Response Guide #	Hazardous Material Description	Number of Observations
US 60	1203	Gasohol, Gasoline, Motor Spirit, Petrol.	16
US 60	1993	Combustible Liquid, n.o.s., Compound tree or weed killing, liquid (flammable), Cosmetics, n.o.s., Diesel fuel, Disinfectant Liquid, n.o.s., Drugs, n.o.s., Ethyl nitrate, Flammable liquid, n.o.s., Fuel oil, Heater for refrigerator car, liquid fuel type, Medicines, flammable, liquid, n.o.s., Refrigerating machine.	4
US 60	1075	Petroleum gases, liquefied or Liquefied petroleum gas	3
US 60	1760	Chemical kit; Compounds, cleaning liquid; Compounds, tree killing, liquid or Compounds, weed killing, liquid; Ferrous chloride, solution; Corrosive liquids, n.o.s	3
US 60	2922	Corrosive liquid, toxic, n.o.s	3

Inbound US 27 (Nicholasville Road)

Data for inbound US 27 were collected at the border of Jessamine County and Fayette County. Table 11 summarizes information for this road segment. It lists the number of trucks observed carrying hazardous materials, total number of trucks observed (i.e., inclusive of those carrying hazardous materials and those not transporting hazardous materials), and the percentage of trucks carrying hazardous materials during the observation period. Table 12 lists the most frequently observed hazardous materials recorded on inbound US 27.

Table 11: Inbound US 27 Observations

Location	Observation Period	Number of Trucks Carrying Hazardous Materials	Total Number of Trucks	Percentage of Trucks Carrying Hazardous Materials
US 27	6:00 am – 8:00 am	1	44	2.27%
US 27	8:00 am – 10:00 am	2	64	3.13%
US 27	10:00 am – 12:00 pm	6	58	10.34%
US 27	12:00 pm – 3:00 pm	3	162	1.85%
US 27	3:00 pm – 4:00 pm	3	39	7.69%
US 27	4:00 pm – 6:00 pm	4	48	8.33%
US 27	6:00 pm – 8:00 pm	2	24	8.33%
US 27	8:00 pm – 10:00 pm	1	16	6.25%
Total		22	455	4.83%

Table 12: Hazardous Materials Most Frequently Observed on Inbound US 27

Location	Hazardous Material #/ Response Guide #	Hazardous Material Description	Number of Observations
US 127	1203	Gasohol, Gasoline, Motor Spirit, Petrol.	8
US 27	127	Class 3: Flammable Liquid	2
US 27	1993	Combustible Liquid, n.o.s., Compound tree or weed killing, liquid (flammable), Cosmetics, n.o.s., Diesel fuel, Disinfectant Liquid, n.o.s., Drugs, n.o.s., Ethyl nitrate, Flammable liquid, n.o.s., Fuel oil, Heater for refrigerator car, liquid fuel type, Medicines, flammable, liquid, n.o.s., Refrigerating machine.	2

Changes from 2011 to 2018

Across all roadways, the number of vehicles observed transporting hazardous materials was 14 percent higher in 2018 than 2011 (the last time a similar study was conducted). Across all roads and study periods, in 2018 the proportion of trucks moving hazardous materials ranged from 1 to 10 percent. When averaged across all study periods, this range narrowed considerably — between 3 and 5 percent of all trucks carried hazardous materials. Examining individual roadways reveals considerable interannual variability in both the overall truck traffic and number of vehicles transporting hazardous materials:

- Northbound I-75 saw a 33 percent increase in total truck traffic and a 23 percent increase in trucks carrying hazardous materials.
- Southbound I-75 experienced a 9.5 percent increase in total truck traffic and a 17.8 percent increase in trucks carrying hazardous materials.
- Eastbound I-64 East witnessed a 7 percent increase in total truck traffic but an 11 percent decrease in trucks carrying hazardous materials.
- Westbound I-64 recorded a 35 percent decrease in total truck traffic and a 28 percent decrease in trucks carrying hazardous materials.
- Inbound US 60 logged a 24 percent decrease in total truck traffic, while the number of observed trucks carrying hazardous materials remained the same.

Moving to a consideration of the materials being shipped, Hazardous Material #1203 (gasoline) remained one of the most-observed substances on the roadways around Fayette County. With respect to hazardous materials type, Hazard Class 3 (flammable liquids such as paints, kerosene, ethanol, and alcohols) continued to be one of the most common materials found on roadways leading to Fayette County.