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# WYOMING COMMODITY FLOW STUDY FOR NIOBRARA COUNTY

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<b>16. Abstract</b> A hazardous materials (HAZMAT) commodity flow study is a transportation analysis study identifying the types and amounts of hazardous materials being transported through a specified geographic area by analyzing current traffic patterns. Transportation of hazardous material may pose a great danger to the public and environment if an incident occurred. The main objectives of this study were to identify what, where and when hazardous material is being transported in Niobrara County. Due to a lack of HAZMAT transportation information within this jurisdiction, collecting new original HAZMAT data was needed. Two locations were identified by the Wyoming State Emergency Response Commission (SERC) in conjunction with the Wyoming Office of Homeland Security (WOHS) and Niobrara County Emergency Management Agency to collect HAZMAT data from highway intersections in Niobrara County. The selected study locations were intersection of US-85 and US-20 in Lusk city and the intersection of US-85 and US-18 in Northeastern Niobrara County. Data analysis showed that the most common HAZMAT being transported is class 3 (flammable liquids) in both locations. It also showed that straight truck is the most common type used to transport HAZMAT in location 1 and truck-trailer is the most commonly used body configuration in location 2. This study provides emergency responders, community planners and organizations information that may aid in enhancing emergency preplanning.					
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# METRIC CONVERSION FACTORS

<b>SI* (MODERN METRIC) CONVERSION FACTORS</b>				
<b>APPROXIMATE CONVERSIONS TO SI UNITS</b>				
Symbol	When You Know	Multiply By	To Find	Symbol
<b>LENGTH</b>				
in	inches	25.4	millimeters	mm
ft	feet	0.305	meters	m
yd	yards	0.914	meters	m
mi	miles	1.61	kilometers	km
<b>AREA</b>				
in <sup>2</sup>	square inches	645.2	square millimeters	mm <sup>2</sup>
ft <sup>2</sup>	square feet	0.093	square meters	m <sup>2</sup>
yd <sup>2</sup>	square yard	0.836	square meters	m <sup>2</sup>
ac	acres	0.405	hectares	ha
mi <sup>2</sup>	square miles	2.59	square kilometers	km <sup>2</sup>
<b>VOLUME</b>				
fl oz	fluid ounces	29.57	milliliters	mL
gal	gallons	3.785	liters	L
ft <sup>3</sup>	cubic feet	0.028	cubic meters	m <sup>3</sup>
yd <sup>3</sup>	cubic yards	0.765	cubic meters	m <sup>3</sup>
NOTE: volumes greater than 1000 L shall be shown in m <sup>3</sup>				
<b>MASS</b>				
oz	ounces	28.35	grams	g
lb	pounds	0.454	kilograms	kg
T	short tons (2000 lb)	0.907	megagrams (or "metric ton")	Mg (or "t")
<b>TEMPERATURE (exact degrees)</b>				
°F	Fahrenheit	5 (F-32)/9 or (F-32)/1.8	Celsius	°C
<b>ILLUMINATION</b>				
fc	foot-candles	10.76	lux	lx
fl	foot-Lamberts	3.426	candela/m <sup>2</sup>	cd/m <sup>2</sup>
<b>FORCE and PRESSURE or STRESS</b>				
lbf	poundforce	4.45	newtons	N
lbf/in <sup>2</sup>	poundforce per square inch	6.89	kilopascals	kPa
<b>APPROXIMATE CONVERSIONS FROM SI UNITS</b>				
Symbol	When You Know	Multiply By	To Find	Symbol
<b>LENGTH</b>				
mm	millimeters	0.039	inches	in
m	meters	3.28	feet	ft
m	meters	1.09	yards	yd
km	kilometers	0.621	miles	mi
<b>AREA</b>				
mm <sup>2</sup>	square millimeters	0.0016	square inches	in <sup>2</sup>
m <sup>2</sup>	square meters	10.764	square feet	ft <sup>2</sup>
m <sup>2</sup>	square meters	1.196	square yards	yd <sup>2</sup>
ha	hectares	2.47	acres	ac
km <sup>2</sup>	square kilometers	0.386	square miles	mi <sup>2</sup>
<b>VOLUME</b>				
mL	milliliters	0.034	fluid ounces	fl oz
L	liters	0.264	gallons	gal
m <sup>3</sup>	cubic meters	35.314	cubic feet	ft <sup>3</sup>
m <sup>3</sup>	cubic meters	1.307	cubic yards	yd <sup>3</sup>
<b>MASS</b>				
g	grams	0.035	ounces	oz
kg	kilograms	2.202	pounds	lb
Mg (or "t")	megagrams (or "metric ton")	1.103	short tons (2000 lb)	T
<b>TEMPERATURE (exact degrees)</b>				
°C	Celsius	1.8C+32	Fahrenheit	°F
<b>ILLUMINATION</b>				
lx	lux	0.0929	foot-candles	fc
cd/m <sup>2</sup>	candela/m <sup>2</sup>	0.2919	foot-Lamberts	fl
<b>FORCE and PRESSURE or STRESS</b>				
N	newtons	0.225	poundforce	lbf
kPa	kilopascals	0.145	poundforce per square inch	lbf/in <sup>2</sup>

\*SI is the symbol for the International System of Units. Appropriate rounding should be made to comply with Section 4 of ASTM E380. (Revised March 2003)

## **EXECUTIVE SUMMARY**

A hazardous materials (HAZMAT) commodity flow study (CFS) is a transportation analysis study identifying the types and amounts of hazardous materials being transported through a specified geographic area by analyzing current traffic patterns. Hazardous materials are substances that would threaten human safety, health, the environment, or property if released. Hazardous materials are classified into nine classes according to the emergency response guide 2016. Transportation of hazardous materials may pose a great danger to the public and environment if an incident occurred. One HAZMAT incident could affect a circle of diameter ranging from 0.5 to 5 miles. Using the data collected in the commodity flow study, emergency responders and community planners will be able to enhance emergency planning capabilities and continue to support existing emergency response organizations.

The objectives of this study were to identify what, where and when hazardous materials are being transported in Niobrara County, identify most likely hazard scenarios that may be expected in that jurisdiction, provide information about the amount of HAZMAT being transported and provide responders, community planners, and organizations information that enhances emergency preplanning.

There is a lack of HAZMAT transportation information in Wyoming. Prior HAZMAT studies in the same geographic area are important as they provide a baseline information for the current situation. Unfortunately, no previous studies were conducted in Niobrara County. Although, several studies were conducted in Wyoming in other counties. The first HAZMAT CFS was conducted back in 1986 in Albany County. A large gap separates the first conducted study and the following conducted studies in Wyoming. The Wyoming State Emergency Response Commission (SERC), in conjunction with the Wyoming Office of Homeland Security (WOHS), has identified the need to conduct HAZMAT CFS in Wyoming to fill in this huge gap. In 2015, a HAZMAT commodity flow study was conducted in Campbell and Converse Counties, followed by more CFS in Laramie County and Albany County in 2016, Natrona County and Sweetwater County in 2017, Johnson County in 2018, and Goshen County in 2019. For Campbell and Converse counties two intersections on WY59 were chosen to collect HAZMAT data. For Laramie County, HAZMAT data was collected from four locations around Cheyenne city. The four locations were: 1) US 85

MP 5, 2) US 85 MP 25, 3) I-80 MP 345, and 4) HW 210 MP 18. For Albany the locations studied were: 1) I-80 MP 307, 2) I-80 MP 333 and 3) US287 at MP 405. The Natrona County CFS locations included: 1) US-220 MP 108, 2) US- 20/26 MP 12, 3) I-25 South MP 182.06 and 4) I-25 North MP 192. The Sweetwater County CFS included the following locations: 1) I-80 MP 66, 2) US-30 MP100 and 3) US-191 MP5. The locations selected for the CFS in Johnson County included: 1) I-25 MP 295, 2) I-90 MP 60, and 3) US-16 MP 5. For Goshen County, two intersections of US-85 and US-26 in Torrington and Lingle were selected to collect HAZMAT data.

Collecting new original HAZMAT data was needed in this study to achieve the required objectives. Data collection was the major task in this study. In consultation with the Emergency Management Coordinator from Niobrara County (James Santistevan), the intersections chosen for the proposed commodity flow study are: intersection of US-85 and US-20 in Lusk and the intersection of US-85 and US-18 in Northeastern Niobrara County at Mule Creek Junction. The exact locations were:

1. The intersection of U.S. Highway 85 and U.S. Highway 20 in Lusk
2. The intersection of U.S. Highway 85 and U.S. Highway 18 in northeastern Niobrara County

Six graduate students from the University of Wyoming volunteered to carry out the road network HAZMAT data collection. Three days during the spring break were selected to collect field data for the selected locations. Field data was collected for the two identified locations for 3 consecutive days with 12 hours per day of data collection, forming a total of 36 hours of counting for each of the two locations. Manual data collection was carried out in this study.

Descriptive analysis of the collected HAZMAT data was performed to clarify the distribution of HAZMAT trucks according to its destination and the different types of HAZMAT being transported at the two study locations according to the placard class and ID. Amounts of HAZMAT being shipped were estimated according to the different body configurations, under the assumption that all the counted HAZMAT trucks are loaded with hazardous materials. The HAZMAT amount was calculated according to the minimum and maximum amount of shipment each body configuration can hold. It should be noted that the only way to obtain the accurate amount of shipped HAZMAT, is by checking the shipment documents, which was not feasible to obtain.

Data analysis showed that the most common HAZMAT class being transported is class 3 which is flammable liquids. Accordingly, it would indicate that the most likely HAZMAT incident could happen would involve a class 3 HAZMAT.

While the exact truck payload of HAZMAT being transported cannot be identified from a field data collection, truck body configuration is a good indication of the amount of HAZMAT being transported. Analysis showed that straight truck (ST) is the most common type to transport HAZMAT in location 1 and truck-trailer (TT) is the most common type used to transport HAZMATs in locations 2. The straight truck can transport from 2,400 to 3,900 US gallons and the truck-trailer can transport from 5,500 to 9,500 US gallons. The estimated minimum/maximum amounts of the transported HAZMATs were 40,326/68,684 US gallons/day for the intersection of US-85 and US-20 in Lusk, and 66,312/114,119 US gallons/day for the intersection of US-85 and US-18 in Northeastern Niobrara County. It should be noted that these numbers were estimated without taking seasonal variation into account due to a lack of seasonal factors for HAZMAT transportation in Wyoming.

This study provides responders, community planners and organizations information that could help in enhancing emergency preplanning also to adjust and schedule the resources to support emergency response capabilities for potential incidents to protect the environment and people.



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# WYOMING COMMODITY FLOW STUDY NIOBRARA COUNTY

**Final Draft Report**  
**April 2019**

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## **LIST OF ACRONYMS/ABBREVIATIONS**

AADT	:	Annual Average Daily Traffic
AC	:	Alternating Current
APRS	:	Automatic Placard Recognition System
CFS	:	Commodity Flow Study
DC	:	Direct Current
DHS	:	Department of Homeland Security
ERG	:	Emergency Response Guide
FHWA	:	Federal Highway Administration
HAZMAT	:	Hazardous Materials
HMCFS	:	Hazmat Commodity Flow Study
HMCRP	:	Hazardous Materials Cooperative Research Program
HRs	:	Hours
HW	:	Highway
I	:	Interstate
ID	:	Identification Number
IR	:	Infra-Red
LED	:	Light-Emitting Diode
LPG	:	Liquefied Petroleum Gases
MADT	:	Monthly Average Daily Traffic
MAWDT	:	Monthly Average Week Day Traffic
MAWET	:	Monthly Average Weekend Traffic

MP	:	Milepost
MT	:	Multi-Trailer
n.o.s	:	not otherwise specified
NVR	:	Network Video Recorder
OCR	:	Optical Character Recognition
PHMSA	:	Pipeline and Hazardous Materials Safety Administration
SERC	:	State Emergency Response Commission
ST	:	Straight Truck
TT	:	Truck Trailer
US	:	United States
V	:	Volts
vpd	:	Vehicles Per Day
WHP	:	Wyoming Highway Patrol
WOHS	:	Wyoming Office of Homeland Security
WYDOT	:	Wyoming Department of Transportation

## **CHAPTER 1- INTRODUCTION**

A hazardous materials (HAZMAT) commodity flow study (CFS) is a transportation analysis study identifying the types and amounts of hazardous materials being transported through a specified geographic area. The CFS clarifies the flow of hazardous materials through a certain area by analyzing current traffic patterns. It provides a reference to match planning programs to existing needs within communities and reduce the occurrence of risky incidents<sup>1</sup>.

Hazardous materials are substances that are flammable, explosive, toxic or any substance that would threaten human safety, health, the environment, or property if released. The effect of the increase in transportation of hazardous materials poses safety, security and environmental issues on all the road users<sup>2</sup>.

Transportation of hazardous material poses a great danger to the public and environment if an incident takes place. Responding to these danger kinds of incidents should be fast and appropriate in order to contaminate the dangerous effect on public and environment and to reduce the produced risk. Necessary equipment and safety precautions are the controlling rules to adequately contaminate the incident released danger. Dealing with different hazardous materials incidents requires different safety precautions and different equipment. Mitigating the danger requires a previous knowledge regarding the nature of HAZMAT in transit through the roads network.

Hazardous materials are classified into 9 classes according to the emergency response guide 2016 (ERG)<sup>3</sup>.

Table 1 shows the different classes and divisions for the hazardous materials.

By using the data collected in the commodity flow study, emergency responders and community planners will be able to enhance emergency planning capabilities and continue to support existing emergency response organizations.

Hazardous Materials Cooperative Research Program (HMCRP) introduced six main steps identifying the commodity flow study process<sup>2</sup>. Figure 1 shows these six steps for the commodity flow study process. This report will discuss the different steps and how they were applied in this study.

**Table 1: Hazardous Materials Classes and Divisions (ERG 2016<sup>3</sup>)**

<p><b>Class 1 - Explosives</b></p> <p>Division 1.1 Explosives with a mass explosion hazard</p> <p>Division 1.2 Explosives which have a projection hazard but not a mass explosion hazard</p> <p>Division 1.3 Explosives which have a fire hazard and either a minor blast hazard or a minor projection hazard or both, but not a mass explosion hazard</p> <p>Division 1.4 Explosives with no significant blast hazard</p> <p>Division 1.5 Very insensitive explosives with a mass explosion hazard</p> <p>Division 1.6 Extremely insensitive articles which do not have a mass explosion hazard</p>
<p><b>Class 2 - Gases</b></p> <p>Division 2.1 Flammable gases</p> <p>Division 2.2 Non-flammable, non-toxic* gases</p> <p>Division 2.3 Toxic* gases</p>
<p><b>Class 3 - Flammable liquids (and Combustible liquids [U.S.]</b></p>
<p><b>Class 4 - Flammable solids; substances liable to spontaneous combustion; substances which, on contact with water, emit flammable gases</b></p> <p>Division 4.1 Flammable solids, self-reactive substances and solid desensitized explosive</p> <p>Division 4.2 Substances liable to spontaneous combustion</p> <p>Division 4.3 Substances which in contact with water emit flammable gases</p>
<p><b>Class 5 - Oxidizing substances and Organic peroxides</b></p> <p>Division 5.1 Oxidizing substances</p> <p>Division 5.2 Organic peroxides</p>
<p><b>Class 6 - Toxic substances and Infectious substances</b></p> <p>Division 6.1 Toxic substances</p> <p>Division 6.2 Infectious substances</p>
<p><b>Class 7 - Radioactive materials</b></p>
<p><b>Class 8 - Corrosive substances</b></p>
<p><b>Class 9 - Miscellaneous dangerous goods/hazardous materials and articles</b></p>



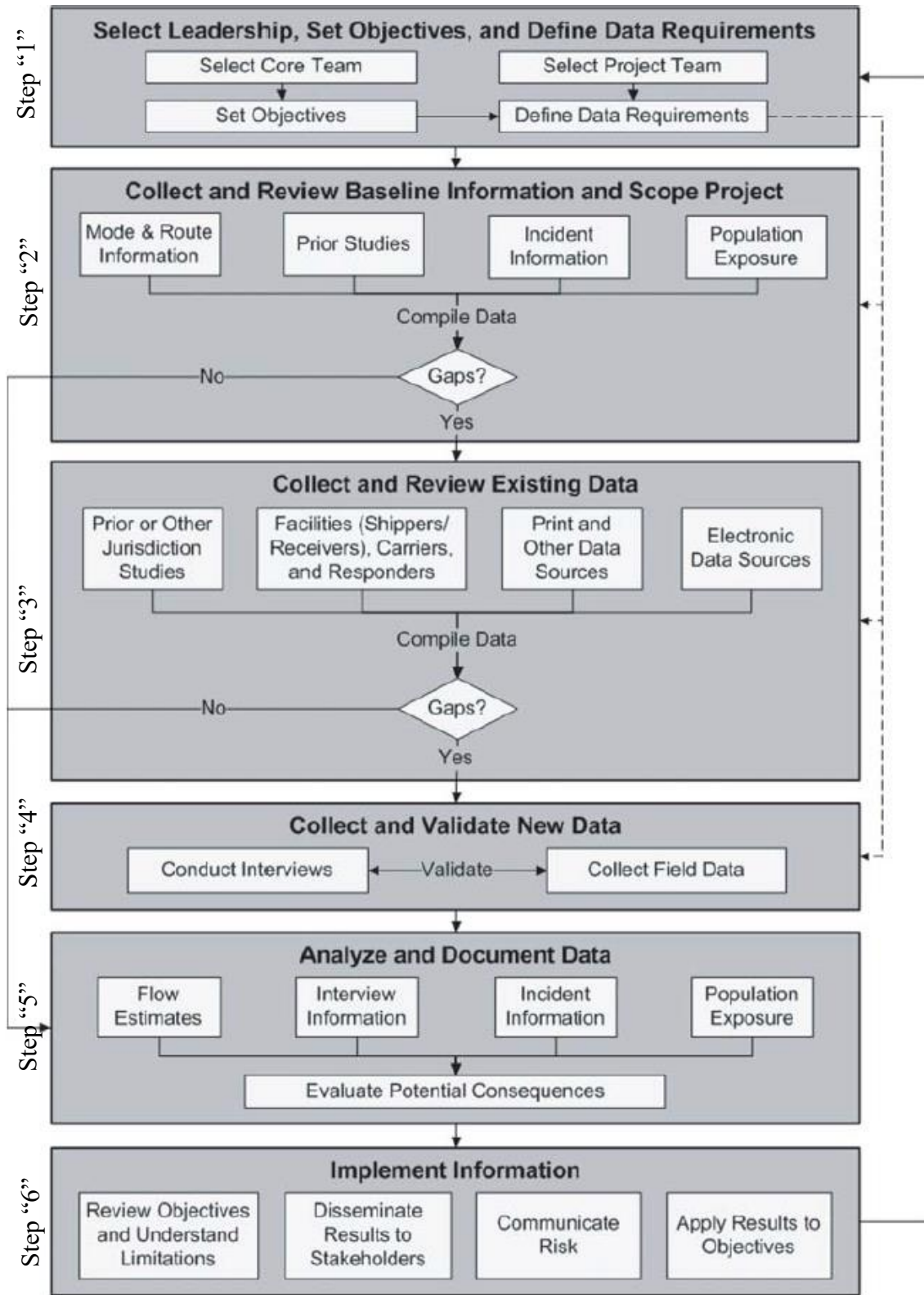


Figure 1: The HAZMAT Commodity Flow Study (HMCFS) Process<sup>2</sup>

## **CHAPTER 2- OBJECTIVES AND PROJECT OUTLINES**

### **GENERAL**

The Wyoming State Emergency Response Commission (SERC), in conjunction with the Wyoming Office of Homeland Security (WOHS) has identified the need to conduct a study of the flow of all HAZMAT commodities in Niobrara County. In consultation with the Emergency Management Coordinator from Niobrara County, James Santistevan, the following roadways (intersections) are chosen for the commodity flow study: the intersection of U.S. Highway 85 and U.S. Highway 20 in Lusk, and the intersection of U.S. Highway 85 and U.S. Highway 18 in Northeastern Niobrara County.

### **OBJECTIVES**

The main goal of the study is to identify hazardous materials transportation patterns on Niobrara County primary highways (intersections) to provide help for emergency management agencies to allocate resources and enhance the emergency preplanning.

The tasks of Wyoming commodity flow study – Niobrara County are as follows:

- Determine the amount of commercial truck traffic moving through certain Niobrara County Highways
- Identify the truck and container types in order to estimate the amount of HAZMAT being transported.
- Determine the type of hazardous materials being transported along the roadways (intersections) designated in the commodity flow study.
- Determine the types and quantities of hazardous materials going through Niobrara County.
- Analyze and document the collected data.

### **DATA REQUIREMENTS**

To achieve the above objectives, a sampling framework was adopted. The data requirements should include the data collection plan and the required level of precision of the data. HAZMAT data was collected during March 2019 for three days from 7:00 am to 7:00 pm forming a total of 36 counting hours per location. One weekend day and two weekdays were considered for the data collection. For the first location (intersection of US-85/US-20 in Lusk) and second location

(intersection of US-85/US-18 in Northeastern Niobrara County) data was collected for one weekend (Sunday, 16<sup>th</sup> of March 2019) and two weekdays (Monday and Tuesday, 17<sup>th</sup> and 18<sup>th</sup> of March 2019). More information about data collection plan is provided in “Data Collection Plan” section.

According to the Guidebook for Conducting Local Hazardous Materials Commodity Flow Studies<sup>2</sup>, Sampling framework is divided into 6 levels. Table 2 shows the different sampling framework used in HAZMAT Commodity Flow Studies (CFSs). HAZMAT truck survey can be done in seven different methods. It depends on the level of data collected about the HAZMAT trucks. Table 3 shows the seven different methods to conduct a HAZMAT placard survey. According to Table 2 and Table 3, data collection in this study can be classified as directional and intersectional surveys with a representative sampling framework.

**Table 2: Sampling frameworks, examples, advantages and disadvantages<sup>2</sup>**

<b>Sampling Framework</b>	<b>Sampling Examples</b>	<b>Advantages</b>	<b>Disadvantages</b>
Convenience	As available for data collectors	Easiest for data collectors; minimum scheduling management	Difficult to reliably identify traffic patterns at any one location or timeframe
Representative	One location per major roadway, at different times of day on any given weekday, during any season	Easy to conduct over time for data collectors; moderate scheduling management; moderate degree of information about traffic patterns for roadway; low-to moderate level of data collection resources required	Cannot be used to reliably characterize traffic on different segments of same road or other roads, determine seasonal traffic patterns, or transport patterns throughout a network
Cluster	Multiple locations per major roadway, at different times of day, on multiple days of week, during multiple seasons	High degree of information about traffic patterns throughout a transportation network	High degree of scheduling management; may require high level of time commitment from data collectors or other data collection resources
Stratified or Proportional	Dependent on traffic characteristics on given network segment; less data is required for low traffic volumes, and more data for high traffic volumes	Very high degree of information about traffic patterns throughout a transportation network; focuses effort on high-priority segments	Requires statistical calculations to determine sampling requirements; extremely high degree of scheduling management; may require high level of data collection resources
Random	At random times of day, days of week, seasons of year, for a specific network segment	Very high degree of information about traffic patterns on sampled network segment	Requires statistical calculations to determine sampling requirements; extremely high degree of schedule management; requires high level of data collection resources
Census	All traffic data for all times of day, days of week, and seasons of year, for specific network segment or entire network	Complete information about traffic patterns at sample locations	Nearly impossible to attain with current systems; requires an extreme degree of data reduction

**Table 3: Traffic and Hazmat placard survey methods**

<b>Survey Method</b>	<b>Description</b>	<b>What It Provides</b>	<b>What It Requires</b>
Total Truck Surveys	A count of the total number of observed trucks	Information about overall truck traffic levels during sampled time periods	Assumptions about hazmat transported on observed trucks (e.g., that hazmat transport conforms to national averages); assumptions about types and configurations of trucks used to transport hazmat
Truck Type and Configuration Surveys	A count of observed trucks by truck type and configuration	Information about truck traffic levels, by type and configuration, during sampled time periods	Assumptions about hazmat transported on observed trucks by type and configuration (e.g., that hazmat transport conforms with national averages)
UN/NA Placard ID Surveys	ID and count of observed hazmat placards	Information about the number and types of hazmat placards present during sampled time periods	Assumptions about truck traffic patterns and the types and configurations of trucks used to transport hazmat
Total Truck Combined with UN/NA Placard ID Surveys	A count of the total number of observed trucks and ID and count of observed hazmat placards	Information about overall truck traffic levels and the number and types of hazmat placards present during sampled time periods	Assumptions about types and configurations of trucks used to transport hazmat; data collectors who can record truck count information and placard information
Truck Type and Configuration Combined with UN/NA Placard ID Surveys	A count of observed trucks by truck type and configuration and ID and count of observed hazmat placards	Information about truck traffic levels by type and configuration and the number and types of hazmat placards present during sampled time periods	Data collectors who can record truck type and configuration and placard information; may require more training of volunteers on data collection process and monitoring of collected data to ensure consistency
Directional and Intersection Surveys	Observation of trucks and/or placards on multiple road directions or at intersections at the same time	Information for more than one roadway lane collected at a single location; may reduce number of data collectors needed	Experienced data collectors; more training of volunteers on data collection process, and monitoring of collected data to ensure consistency
Manifest Surveys	Review of information found on shipping papers and interviews of truck drivers	Highly specific information about hazmat shipment content for both placarded and un-placarded loads	Coordination with local, state, or federal license and weigh stations or patrol units; potentially, a very intensive data collection process for high-traffic roadways

## **CHAPTER 3- BACKGROUND AND BASELINE INFORMATION**

### **GENERAL**

The scope of this study focuses on collecting information on HAZMAT transportation on major highways in Lusk and Northeastern Niobrara County, Wyoming. These major highways are U.S. Highway 85, U.S. Highway 20, and U.S. Highway 18. US-85 is a north-south United States highway that travels through Mountain-Northern Plains states. It enters Wyoming from Colorado, 8 miles south of Cheyenne. It meets with US-26 in Torrington and runs concurrently with US-26 for 10 miles until Lingle and from where it separates and runs northbound. Later it meets US-20 and US-18 at Lusk. US-20 is an east-west United States highway and it is the longest road in the United States. The eastern part of the highway enters through Yellowstone National Park and runs concurrently with other state highways. US-20 and US-18 runs concurrently from Orin to Lusk and separates there, US-20 enters Nebraska. US-18 is also an east-west United States highway. After separating from US-20 at Lusk, US-18 runs concurrently with US-85. It separates from US-85 at Mule Creek Junction in Northeastern Niobrara County and runs eastwards to enter South Dakota. The three state highways are two-lane two-way.

According to the Pipeline and Hazardous Materials Safety Administration (PHMSA) Incident Reports Database, there was one HAZMAT incident in Lusk, Niobrara County in 2013<sup>4</sup>. Total losses from the HAZMAT incident was approximately \$12,000 and included Class 3 HAZMAT. Moreover, weather plays a major role in increasing the possibility of having a HAZMAT incident. Adverse weather conditions (rain, snow, fog, and blowing snow) may cause reduction in visibility, which is an important factor that affects the risk of road crashes.

Wyoming's energy industries, oil and gas, uranium, coal and other extracted minerals, are the main sources of HAZMAT materials being transported in Wyoming<sup>5</sup>. It was reported in the Wyoming state emergency response commission report that 36 facilities in Niobrara County store HAZMATs<sup>5</sup>.

### **BASELINE DATA**

Prior HAZMAT studies in the same geographic area are important as they provide a baseline information for the current situation. However, no CFS was available or carried out previously for

the Niobrara County. The first HAZMAT study in Wyoming was previously conducted in Albany County, Wyoming back in 1986<sup>6</sup>. The objectives of the study were to:

- Determine the effect of different seasons on truck and railroad traffic volumes.
- Determine the percentage of traffic transporting HAZMAT.
- Classify the HAZMAT being transported.
- Determine the accuracy of the HAZMAT placards.
- Determine the condition of the trucks and trains transporting HAZMAT.
- Determine the amount of HAZMAT being transported in Albany County.

The study identified the major arterials used to transport HAZMAT within Albany County. The data was collected for 48 hours in different weekdays. Data were collected for 3 hours per day in the morning and afternoon. The study showed that 5.25% of the truck traffic contained hazardous materials. It was also stated that 73% of the trucks were out of service, and the remaining were in good condition. The study stated that the accuracy of placard system is approximately 50%, this accuracy was roughly estimated by the Wyoming Highway Patrol (WHP) with no supporting data presented in the report.

It is worth mentioning that in previous years several CFSs were carried out by the Department of Civil & Architectural Engineering, University of Wyoming. The study locations included Campbell and Converse counties in 2015, Laramie County and Albany County in 2016, Natrona and Sweetwater County in 2017, Johnson County in 2018, and Goshen County in 2019. Two intersections on WY 59 were chosen to collect HAZMAT data for Campbell and Conserve counties Commodity Flow Study<sup>7</sup>. The locations studied for the Laramie County Commodity Flow study<sup>8</sup> were: 1) US 85 MP 5, 2) US 85 MP 25, 3) I-80 MP 345, and 4) HW210 MP18 and for the Albany County Commodity Flow Study<sup>9</sup> the locations were: 1) I-80 MP 307, 2) I-80 MP 333 and 3) US287 at MP 405. The Natrona County Commodity Flow Study<sup>10</sup> locations included: 1) US-220 MP 108, 2) US- 20/26 MP 12, 3) I-25 South MP 182.06 and 4) I-25 North MP 192. The Sweetwater County Commodity Flow Study<sup>11</sup> included the following locations: 1) I-80 MP 66, 2) US-30 MP100 and 3) US-191 MP5. The locations studied for the Johnson County CFS<sup>12</sup> were: 1)

I-25 MP 295, 2) I-90 MP 60, and 3) US-16 MP 5. For Goshen County CFS<sup>13</sup>, the locations selected to collect HAZMAT data were intersections of US-85 and US-26 in Torrington and Lingle.

In addition to the HAZMAT data collected on the roadway sections mentioned above, HAZMAT transportation using the railroad via Union Pacific Railroad was analyzed as well in the Albany County Commodity Flow Study.

## **CHAPTER 4- COLLECTING AND REVIEW EXISTING DATA**

As mentioned earlier, no prior hazardous material commodity flow study was conducted in Niobrara County, Wyoming. However, several HAZMAT CFSs were conducted in other counties in Wyoming, as previously mentioned.

Due to a lack of information about the HAZMAT transportation in Niobrara County, collecting new data was needed to achieve the study objectives. Manual Data collection was the only method used to collect HAZMAT data in this study. Six graduate students from the University of Wyoming volunteered to carry out the data collection. Raw data for the study is presented in Appendix C.



## **CHAPTER 5- NEW DATA COLLECTION**

An essential task of this study was to collect HAZMAT traffic data from the 2 main locations on Niobrara County intersections. As previously mentioned, the intersections of US-85 and US-20 in Lusk, and the intersection of US-85 and US-18 in Northeastern Niobrara County were determined by the Wyoming State Emergency Response Commission (SERC) in consultation with the Emergency Management Coordinator from Niobrara County, James Santistevan.

Six graduate students from the University of Wyoming volunteered to carry out the HAZMAT data collection. A total of 3 days of HAZMAT data collection were conducted during the period from 16<sup>h</sup> to 18<sup>th</sup> of March 2019. Data was collected manually by counting traffic volumes, truck and HAZMAT volumes, and recording the HAZMAT placard details on the data sheets.

### **DATA COLLECTION LOCATIONS**

The two proposed data collection locations were on intersections of Niobrara County highways as shown in Figure 2. Figure 2 shows general map of the data collection locations along with the inset maps showing detailed view of the study locations. Location 1 is a 4 leg-intersection of two-lane two-way highways (US-85 and US-20) with traffic movements in 12 directions (Figure 2). Location 2 is a 3 leg-intersection of two-lane two-way highways (US-85 and US-18) with traffic movements in 6 directions (Figure 2).

### **DATA COLLECTION PLAN**

Most of the Hazardous Material Commodity Flow Study (HMCFS) use volunteers in order to collect required information about HAZMAT trucks passing at a certain route. In this study, the level of data collection is classified as directional and intersectional surveys with a representative sampling framework<sup>2</sup>. Count data for all vehicle types and HAZMAT trucks data were collected for all the directions for each of the locations as shown in Figure 2.

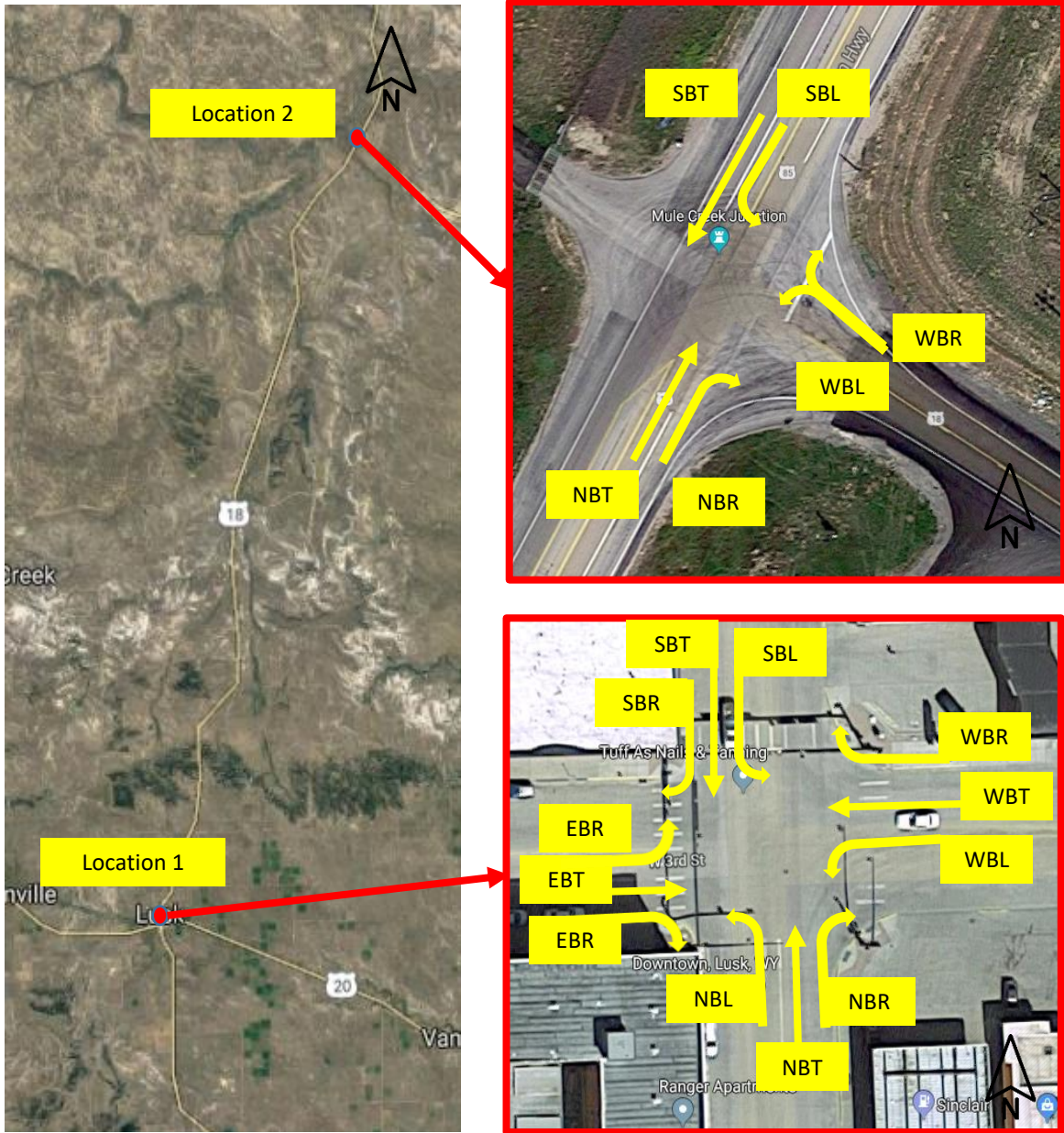


Figure 2 Data collection locations in Niobrara County

A data collection sheet, shown in Appendix “A”, was designed to collect Placard ID, Placard Class, Truck Body Configuration, Cargo Type, and Direction. Due to the high speed limit on the study locations, 2 to 3 seconds was the available time to collect all the aforementioned data. Moreover, a truck count was conducted so as to estimate the percentage of HAZMAT trucks passing through each location. Truck count sheets are provided in Appendix A. Another challenge faced during the data collection was the multiple trucks passing at the same time. Due to these issues, volunteers participated in this study received training in order to be able to capture the correct information on the placard and the truck in few seconds.

Data from each of the locations (Figure 2) was collected by 3 volunteers, 1 per 4-hour shift. As shown in Table 4 data collection periods consisted of 3 consecutive days; one weekend and two weekdays. HAZMAT traffic counts were conducted for 12 hours per day.

**Table 4: Scheduled Data Collection Plan for Niobrara County**

	Location	Day	Date	Time		Total Number of (HRs)
				From	To	
1	Intersection of US-85/US-20 in Lusk	Sunday, Monday, Tuesday	16 <sup>th</sup> , 17 <sup>th</sup> and 18 <sup>th</sup> of March 2019	7:00am	7:00pm	12hr×3d = 36hrs
2	Intersection of US-85/US-18 in Northeastern Niobrara County					

**AVERAGE DAILY TRAFFIC**

Traffic pneumatic tube counters can be used to collect annual average daily traffic (AADT), truck percentage, and vehicle classification. Installing pneumatic traffic tubes on the study locations were impossible due to the high traffic volumes and high operating speeds and accordingly they were not used to collect ADTs for the study locations. The Wyoming Department of Transportation (WYDOT) has several automatic traffic recorders, classifiers and count sites that provide the ADT for Wyoming’s highways. However, there were no traffic recorders placed to count the ADT of

the intersections. As a result, ADTs and truck counts had to be done manually. Table 5 shows the traffic data for the selected study locations.

**Table 5: Traffic Data for the three data collection locations**

<b>Location</b>	<b>MADT</b>	<b>MAWDT</b>	<b>MAWET</b>	<b>% of trucks</b>	<b>% of HAZMAT trucks from truck traffic</b>
Intersection of US-85/US-20 in Lusk	1238	1105	1605	21.60%	4.87%
Intersection of US-85/US-18 in Northeastern Niobrara County	3940	4086	3540	7.67%	3.77%

The HAZMAT truck percentages were calculated based on the percentage of HAZMAT trucks collected from the field data collection

Where:

MADT : Monthly Average Daily Traffic.

MAWDT : Monthly Average Week Day Traffic.

MAWET : Monthly Average Weekend Traffic.

### **CHALLENGES AND DATA COLLECTION DIFFICULTIES**

Many difficulties were faced by the data collection team while collecting the data. Some of these difficulties can be summarized as follows:

- Due to the high operating speed, errors in collecting data might occur.
- Due to the high speed, missing data may be presented when having more than two placards mounted on the same truck.
- In some cases, errors in data collection might happen as more than one HAZMAT truck pass at the same time.
- When trucks or other vehicles are present on both lanes, this might block the vision to collect placard data on HAZMAT trucks.
- There is no fixed location for the HAZMAT placard on the truck body, which represents a challenge to trace its location for each truck as shown in pictures in Appendix B.

## CHAPTER 6- DATA ANALYSIS

This section provides descriptive analysis of the collected HAZMAT data. It presents the distribution of HAZMAT trucks according to its destination, and the different types of HAZMAT being transported at the study locations according to the placard class and ID. Moreover, it shows the different amounts of HAZMAT being shipped according to the different body configurations.

### HAZMAT TRANSPORTATION USING NIOBRARA COUNTY HIGHWAYS

#### HAZMAT DIRECTIONAL DISTRIBUTION

As mentioned earlier, the study locations were the intersection of US-85 and US-20 in Lusk and the intersection of US-85 and US-18 in Northeastern Niobrara County. Directional distribution provides the information about the percentage of HAZMAT trucks moving in each direction. Table 6 shows the HAZMAT directional distribution for each study location.

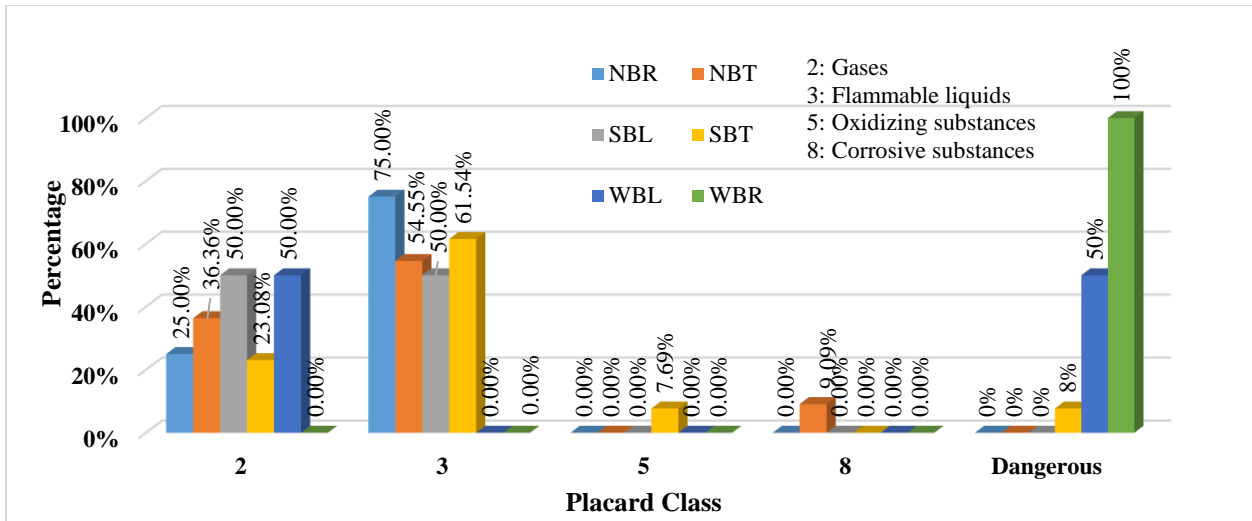
**Table 6: Directional Distribution for HAZMAT trucks for each study location**

#	Location	Direction	Percentage of HAZMAT trucks for each direction and its count
1	Intersection of US-85/US-20 in Lusk	NBR	12.12%- 4
		NBT	33.33%- 11
		SBL	6.06%- 2
		SBT	39.39%- 13
		WBL	6.06%- 2
		WBR	3.03%- 1
2	Intersection of US-85/US-18 in Northeastern Niobrara County	NBR	13.16%- 5
		NBT	18.42%- 7
		SBL	7.89%- 3
		SBT	28.95%- 11
		WBL	21.05%- 8
		WBR	10.53%- 4

Data represents percentage of total HAZMAT counted for each direction in the study locations and its percentage

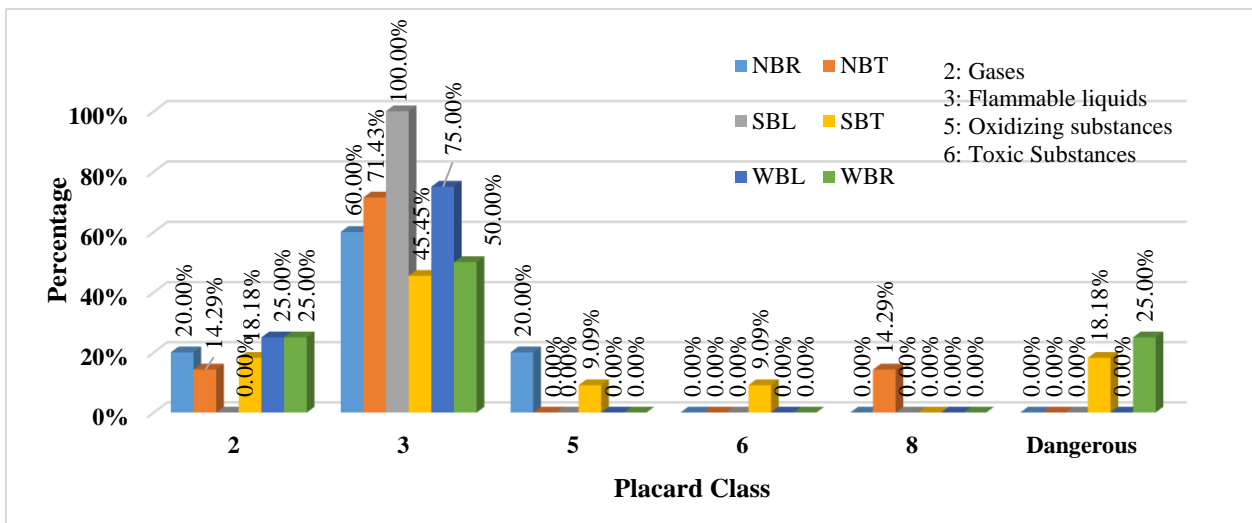
#### HAZMAT CLASS DISTRIBUTION

Figure 3 and Figure 4 show how the different percentages of the HAZMAT class being transported in the study locations per direction. Flammable liquids (Class 3) HAZMAT has the highest percentage among the transported HAZMAT classes in both the locations averaged for all directions. It represents 40% of transported HAZMAT through the 1<sup>st</sup> location (Figure 3), and 67% through the 2<sup>nd</sup> location (Figure 4).



Data represents the percentage of HAZMAT classes from the total HAZMATs shipped in a certain direction

**Figure 3: HAZMAT placard class percentages for the intersection of US-85/US-20 in Lusk**



Data represents the percentage of HAZMAT classes from the total HAZMATs shipped in a certain direction

**Figure 4: HAZMAT placard class percentages for the intersection of US-85/US-18 in Northeastern Niobrara County**

### ESTIMATION OF HAZMAT AMOUNT BEING TRANSPORTED

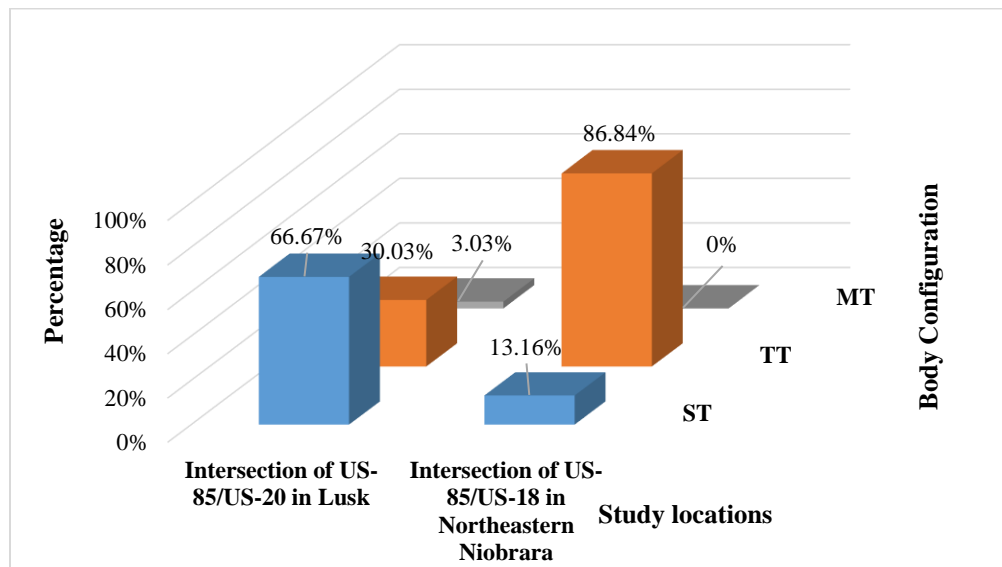
Collecting the body configuration information in the data provides a rough estimate of the HAZMAT amount being transported. Straight truck may have a capacity ranging from 2,400 to 3,900 US gallons. A truck-trailer may have a capacity of 5,500 to 9,500 US gallons while a multi-trailer may have a capacity of 9,500 to 19,000 US gallons. Two main underline assumptions were

considered to estimate the amount of HAZMAT being transported in the study locations. The two assumptions are as follows:

- 1) All the counted HAZMAT trucks, trucks with placards, are considered to be loaded with its minimum or maximum capacity.
- 2) The estimated minimum and maximum amounts are based on the body configuration not the body type.

According to the two assumptions, partially loaded trucks might be counted and included in the estimated amounts as a fully loaded truck. Also, different body types were not considered in the calculations of the HAZMAT amounts (e.g. a semi-trailer with a high-pressure tank or a mixed cargo were considered as a truck trailer body configuration with the same min/max amount of HAZMAT). It should be noted that the only way to obtain the accurate amount of shipped HAZMATs is by checking the shipment documents, which was not feasible to perform in this study.

Truck-trailer (TT) and straight truck are the most common body configuration used for transporting HAZMAT in location 1 and 2, respectively. Figure 5 shows the different percentages of body configuration for HAZMAT trucks in the study locations.



Data represents the percentage of different truck body configurations from the total trucks passing at each study location separately.

**Figure 5: Percentage of HAZMAT trucks by body configuration for the study locations**

Table 7 shows an estimation of the amount of HAZMAT being transported on the study locations in the US gallons per day. The minimum and maximum amounts were calculated using the following equations:

Total min amount = MADT  $\times$  % of trucks  $\times$  % of HAZMAT trucks  $\times$  body config.  $\times$  min capacity

Total max amount = MADT  $\times$  % of trucks  $\times$  % of HAZMAT trucks  $\times$  body config.  $\times$  max capacity

Where:

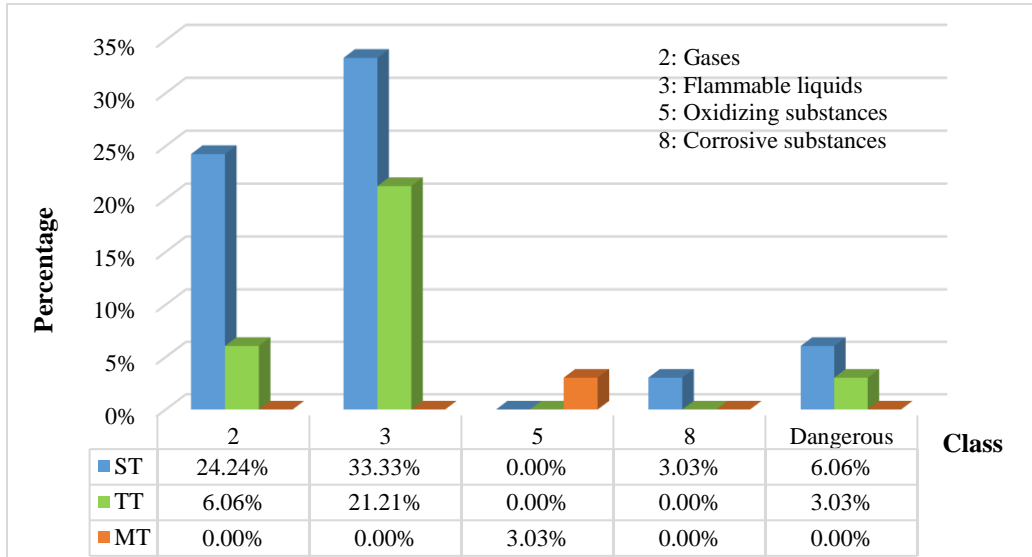
MADT: Monthly Average Daily Traffic.



**Table 7: Estimation of the amount of HAZMAT transported in the study locations**

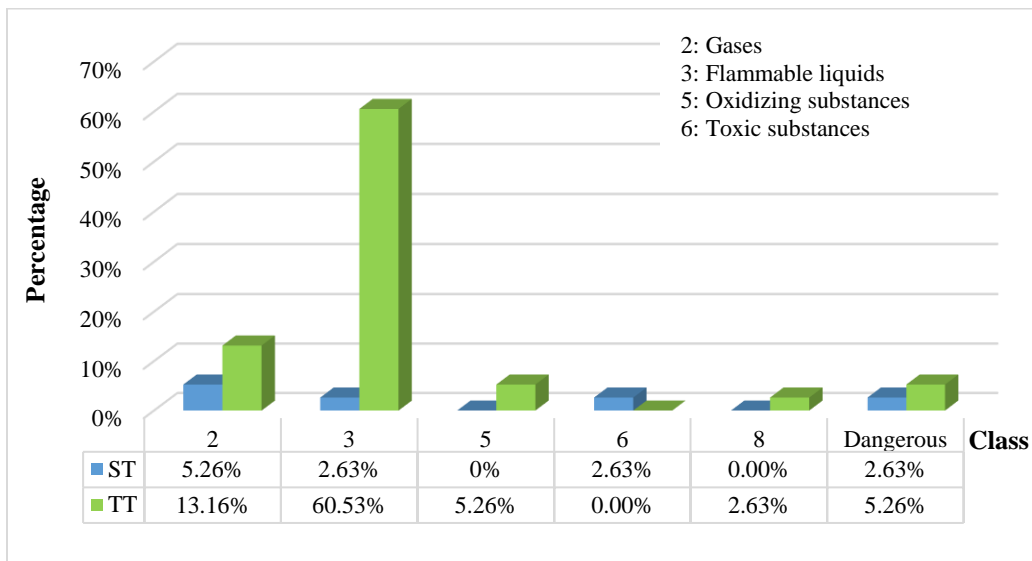
Study Locations	MADT	% of trucks	% of HAZMAT trucks	Number of HAZMAT trucks per day (Monthly average)	HAZMAT trucks body configuration Percentages		Min. Capacity per truck type (US gallons)	Max. Capacity per truck type (US gallons)	Total Min. amount (US gallons / day)	Total Max. Amount (US gallons / day)	Total amount (US gallons / day) Min/ Max
Intersection of US-85/US-20 in Lusk	3940	7.67%	3.77%	11.39	TT	30.03%	5,500	9,500	18,817	32,502	40,326/ 68,684
					MT	3.03%	9500	19000	3,279	6,559	
					ST	66.67%	2,400	3,900	18,229	29,623	
Intersection of US-85/US-18 in Northeast Niobrara County	1238	21.60%	4.87%	13.02	TT	86.84%	5,500	9,500	62,199	107,435	66,312/ 114,119
					ST	13.16%	2,400	3,900	4,113	6,684	

Figure 6 and Figure 7 show the different percentages of truck body configuration used to transport different HAZMAT classes. The percentages provided in the figures are calculated from the grand total of the HAZMAT trucks.



Data represents the percentage of different body configurations transporting different HAZMAT classes from the total HAZAMTs transported at a certain study location.

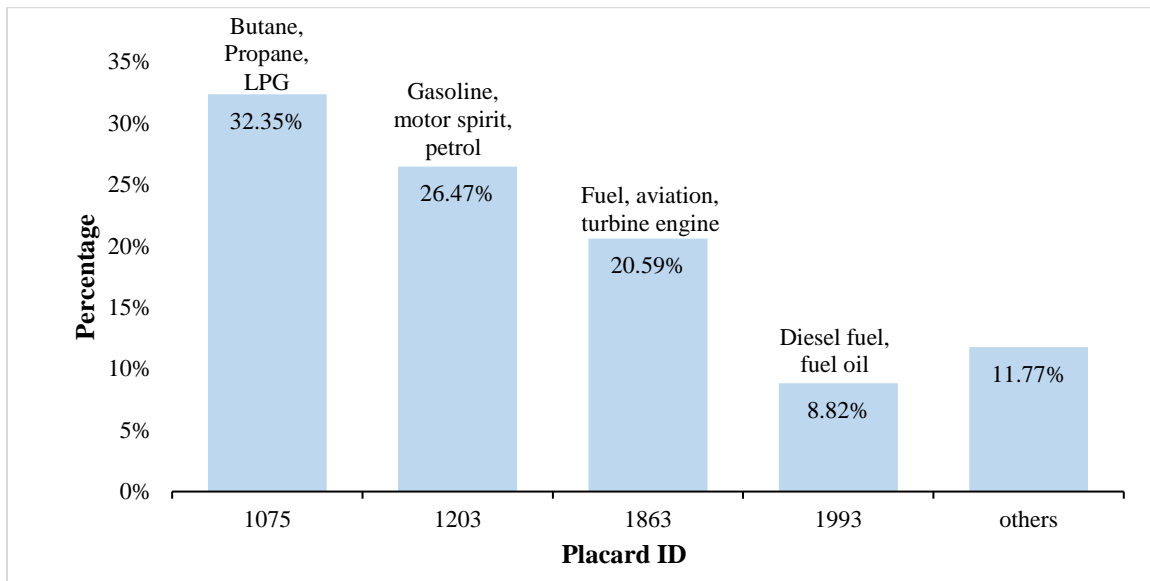
**Figure 6: Body configuration percentages by HAZMAT classes for the intersection of US-85/US-20 in Lusk**



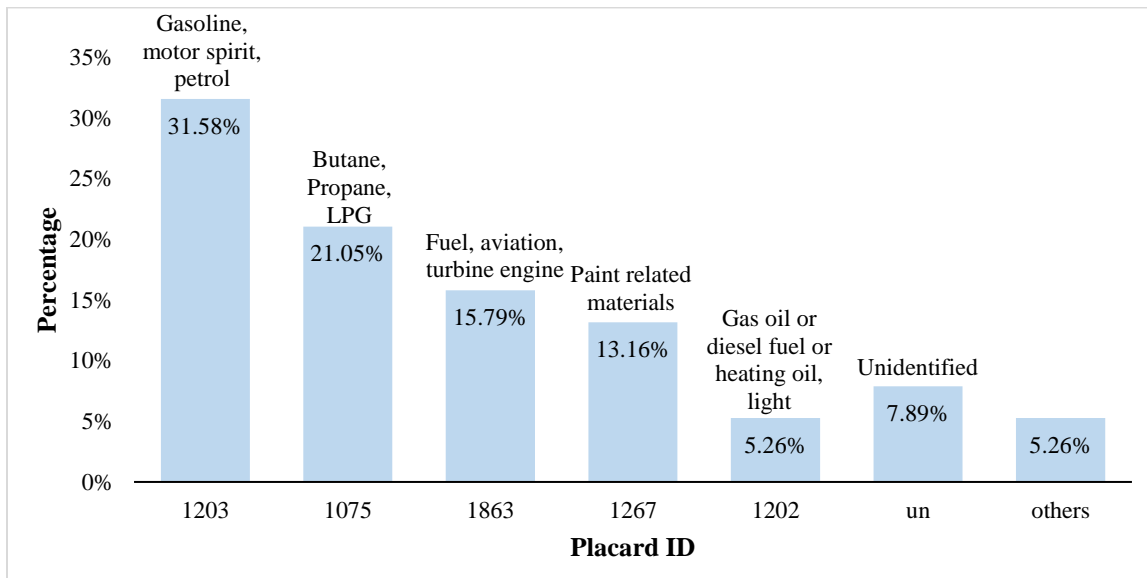
Data represents the percentage of different body configurations transporting different HAZMAT classes from the total HAZAMTs transported at a certain study location.

**Figure 7: Body configuration percentages by HAZMAT classes for the intersection of US-85/US-18 in Northeastern Niobrara County**

Each placard ID refers to the material being shipped. Figure 8 show that at location 1 (intersection of US-85 and US-20 in Lusk) majority of the HAZMATs transported were Butane, Propane, LPG (HAZMAT placard with ID number 1075). At the 2<sup>nd</sup> location (intersection of US-85 and US-18 in Northeastern Niobrara County) gasoline, motor spirit, or petrol (HAZMAT placard with ID number 1203) was transported the most as shown in Figure 9.



**Figure 8: Placard ID number percentages at 1<sup>st</sup> location (Intersection of US-85/US-20 in Lusk)**



**Figure 9: Placard ID number percentages at 2<sup>nd</sup> location (Intersection of US-85/US-18 in Northeastern Niobrara County)**

## **CHAPTER 7- CONCLUSIONS**

Hazardous material commodity flow studies are studies identifying what, where and when HAZMAT is being transported in a certain jurisdiction. In 2011, Hazardous Materials Cooperative Research Program (HMCRP) published the guidebook for conducting local hazardous materials commodity flow studies. Six main steps were identified by the guidebook. One important step is to collect and review existing HAZMAT data. There is a lack of previous HAZMAT commodity flow studies in Wyoming. No commodity flow study was performed in Niobrara County, Wyoming previously. One commodity flow study was performed in 1986 in Albany County. In Wyoming, commodity flow studies were conducted in Campbell and Converse Counties in 2015, Laramie County and Albany County in 2016, Natrona County and Sweetwater County in 2017, Johnson County in 2018, and Goshen County in 2019.

Collecting new data was essential for this study due to the absence of any CFS within the jurisdiction. The purpose of this commodity flow study was to identify and provide information about the different types and amounts of hazardous materials being transported in Niobrara County. Providing such critical information will help emergency responders and community planners to enhance emergency planning and capabilities, mitigating the dangerous effect associated with any HAZMAT incident. A comprehensive three days (one weekend day and two weekdays) of data collection was performed to fulfill the study objectives. Manual data collection was performed by six volunteered graduate students from the University of Wyoming.

Two locations determined by the SERC, in consultation with the Emergency Management Coordinator from Niobrara County, James Santistevan, were investigated in the study. The two locations were on intersections of highways in Lusk and Northeastern Niobrara County: intersections of US-85 and US-20 and the intersection of US-85 and US-18.

Table 8 shows a summary for all the data analysis provided in this report for the two intersections studied.

**Table 8: Summary of data analysis for Niobrara County HAZMAT study**



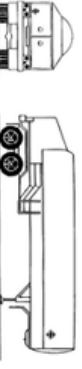
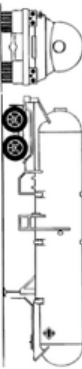
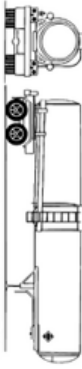


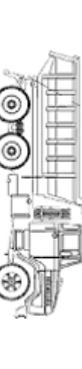

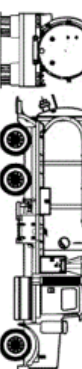


Location	Direction	% of HAZMAT by class		% of Body configuration used to transport Hazmat		Estimated Min. and Max. Amounts of HAZMATs (US gallons/day)		% of most common transported HAZMAT		
		Class	%	Body Config.	%	Min.	Max.	Placard ID	Material	%
Intersection of US-85/US-20 in Lusk	NBR	3- Flammable Liquids	75%	TT	30.03%	40,326	68,684	1075	Butane, Propane, LPG	32.35%
		2- Gases	25%							
	NBT	3- Flammable Liquids	54.55%	MT	3.03%					
		2- Gases	36.36%							
	SBL	3- Flammable Liquids	50%	MT	3.03%					
		2- Gases	50%							
	SBT	3- Flammable Liquids	61.54%	MT	3.03%					
		Others	38.46%							
	WBL	2- Gases	50%	MT	3.03%					
		Others	50%							
	WBR	Dangerous	100%	ST	66.67%					
		Others	0%							
Intersection of US-85/US-18 in Northeastern Niobrara County	NBR	3- Flammable Liquids	60%	TT	86.84%	66,312	114,119	1203	Gasoline, motor spirit, petrol	31.58%
		Others	40%							
	NBT	3- Flammable Liquids	71.43%	TT	86.84%					
		Others	28.57%							
	SBL	3- Flammable Liquids	100%	TT	86.84%					
		Others	0%							
	SBT	3- Flammable Liquids	45.45%	TT	86.84%					
		Others	54.55%							
	WBL	3- Flammable Liquids	75%	TT	86.84%					
		Others	25%							
	WBR	3- Flammable Liquids	50%	ST	13.16%					
		Others	50%							
WBR	3- Flammable Liquids	50%	ST	13.16%						
	Others	50%								

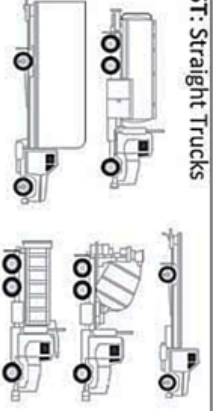
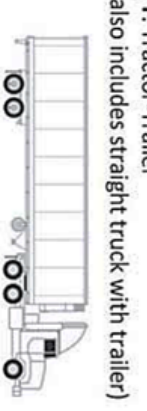

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13. Ahmed, I. U., Gaweesh, S., & Ahmed, M. WYOMING COMMODITY FLOW STUDY FOR GOSHEN COUNTY. (2019)

# APPENDIX A: DATA COLLECTION SHEETS

HAZMAT Commodity Flow Study - Data Collection Sheet																						
Name: <input style="width: 150px;" type="text"/>		Location: <input style="width: 150px;" type="text"/>		Weather: <input style="width: 150px;" type="text"/>		Page Number: <input style="width: 50px;" type="text"/>																
Day: <input style="width: 150px;" type="text"/>		Date: <input style="width: 150px;" type="text"/>		Start Time: <input style="width: 150px;" type="text"/>		End Time: <input style="width: 150px;" type="text"/>																
No.	Time	UN Placard ID			Placard type	Body Configuration			Cargo Body / Trailer Type										Direction			
1					Un	ST	TT	MT	Un	1	2	3	4	5	6	7	8	9	10	11	12	Un
2					Un	ST	TT	MT	Un	1	2	3	4	5	6	7	8	9	10	11	12	Un
3					Un	ST	TT	MT	Un	1	2	3	4	5	6	7	8	9	10	11	12	Un
4					Un	ST	TT	MT	Un	1	2	3	4	5	6	7	8	9	10	11	12	Un
5					Un	ST	TT	MT	Un	1	2	3	4	5	6	7	8	9	10	11	12	Un
6					Un	ST	TT	MT	Un	1	2	3	4	5	6	7	8	9	10	11	12	Un
7					Un	ST	TT	MT	Un	1	2	3	4	5	6	7	8	9	10	11	12	Un
8					Un	ST	TT	MT	Un	1	2	3	4	5	6	7	8	9	10	11	12	Un
9					Un	ST	TT	MT	Un	1	2	3	4	5	6	7	8	9	10	11	12	Un
10					Un	ST	TT	MT	Un	1	2	3	4	5	6	7	8	9	10	11	12	Un
11					Un	ST	TT	MT	Un	1	2	3	4	5	6	7	8	9	10	11	12	Un
12					Un	ST	TT	MT	Un	1	2	3	4	5	6	7	8	9	10	11	12	Un
13					Un	ST	TT	MT	Un	1	2	3	4	5	6	7	8	9	10	11	12	Un
14					Un	ST	TT	MT	Un	1	2	3	4	5	6	7	8	9	10	11	12	Un
15					Un	ST	TT	MT	Un	1	2	3	4	5	6	7	8	9	10	11	12	Un
16					Un	ST	TT	MT	Un	1	2	3	4	5	6	7	8	9	10	11	12	Un
17					Un	ST	TT	MT	Un	1	2	3	4	5	6	7	8	9	10	11	12	Un
18					Un	ST	TT	MT	Un	1	2	3	4	5	6	7	8	9	10	11	12	Un
19					Un	ST	TT	MT	Un	1	2	3	4	5	6	7	8	9	10	11	12	Un
20					Un	ST	TT	MT	Un	1	2	3	4	5	6	7	8	9	10	11	12	Un
21					Un	ST	TT	MT	Un	1	2	3	4	5	6	7	8	9	10	11	12	Un
22					Un	ST	TT	MT	Un	1	2	3	4	5	6	7	8	9	10	11	12	Un
23					Un	ST	TT	MT	Un	1	2	3	4	5	6	7	8	9	10	11	12	Un
24					Un	ST	TT	MT	Un	1	2	3	4	5	6	7	8	9	10	11	12	Un
25					Un	ST	TT	MT	Un	1	2	3	4	5	6	7	8	9	10	11	12	Un
26					Un	ST	TT	MT	Un	1	2	3	4	5	6	7	8	9	10	11	12	Un
27					Un	ST	TT	MT	Un	1	2	3	4	5	6	7	8	9	10	11	12	Un
28					Un	ST	TT	MT	Un	1	2	3	4	5	6	7	8	9	10	11	12	Un
29					Un	ST	TT	MT	Un	1	2	3	4	5	6	7	8	9	10	11	12	Un
30					Un	ST	TT	MT	Un	1	2	3	4	5	6	7	8	9	10	11	12	Un

Cargo Body / Trailer Type		
 1 Compressed Gas/ Tube Trailer	 2 DOT412, TC412, SCT-312 Corrosive Liquid Tank (MC312, TC312)	 3 MC338, TC338, SCT-338 Cryogenic Liquid Tank (TC341, CGA341)
 5 MC331, TC331, SCT-331 High Pressure Tank	 6 DOT407, TC407, SCT-307 Low Pressure Chemical Tank (MC307, TC307)	 7 DOT406, TC406, SCT-306 Non-pressure Liquid Tank (MC306, TC306)
 9 Low Bed Trailer	 10 Dump Truck	 11 Cement Mixer
	 12 Vacuum loaded tank	 8 Mixed Cargo
		 4 Dry Bulk Cargo Trailer

Body Configuration
ST: Straight Trucks 
TT: Tractor-Trailer (also includes straight truck with trailer) 
MT: Tractor with Multiple Trailers 

Placard type		
1 	2 	2 
4 	4 	4 
8 	9 	9 
4 	5 	2 
6 	6 	3 
10 	7 	





APPENDIX B: PHOTOS





## APPENDIX C: RAW DATA FOR HIGHWAY MODE OF TRANSPORTATION

### LOCATION 1: INTERSECTION OF US-85/US-20 IN LUSK

Serial	Time	Date	Day	Direction	Placard #	Class	Body Config	Cargo Type
1	10:19	03/17/19	Sunday	SBT	1075	2	ST	5
2	10:58	03/17/19	Sunday	SBT	1075	2	ST	5
3	11:54	03/17/19	Sunday	NBT	1202	3	ST	7
4	12:40	03/17/19	Sunday	NBT	1049	2	ST	1
5	7:30	03/18/19	Monday	NBT	1993	3	ST	9
					2735	8		
6	8:35	03/18/19	Monday	NBR	1203	3	ST	7
7	10:26	03/18/19	Monday	SBT	1075	2	ST	2
8	10:45	03/18/19	Monday	NBR	1993	3	ST	9
9	15:40	03/18/19	Monday	WBL	1075	2	ST	5
10	15:46	03/18/19	Monday	SBT	1863	3	TT	7
11	16:34	03/18/19	Monday	SBT	1863	3	TT	7
12	16:43	03/18/19	Monday	NBT	1075	2	ST	5
13	16:59	03/18/19	Monday	SBT	1863	3	TT	7
14	18:29	03/18/19	Monday	NBT	1993	3	TT	6
15	8:58	03/19/19	Tuesday	SBL	1075	2	ST	5
16	9:02	03/19/19	Tuesday	NBT	1075	2	TT	5
17	9:40	03/19/19	Tuesday	WBL	1203	10	ST	5
18	11:30	03/19/19	Tuesday	WBR	1203	10	TT	7
19	11:34	03/19/19	Tuesday	NBR	1203	3	ST	5
20	11:37	03/19/19	Tuesday	NBT	1203	3	ST	7
21	11:44	03/19/19	Tuesday	SBT	1075	10	ST	5
22	12:32	03/19/19	Tuesday	SBL	1203	3	TT	7
23	12:43	03/19/19	Tuesday	SBT	1863	3	TT	7
24	12:52	03/19/19	Tuesday	SBT	1203	3	ST	7
25	13:01	03/19/19	Tuesday	SBT	1203	3	TT	7
26	13:15	03/19/19	Tuesday	NBT	1075	2	TT	8
27	13:37	03/19/19	Tuesday	NBT	1075	8	ST	5
28	15:28	03/19/19	Tuesday	NBR	1075	2	ST	6
29	15:39	03/19/19	Tuesday	NBT	1863	3	ST	7
30	15:50	03/19/19	Tuesday	SBT	1942	5.1	MT	4
31	16:18	03/19/19	Tuesday	NBT	1863	3	ST	7
32	16:37	03/19/19	Tuesday	SBT	1203	3	ST	7
33	17:37	03/19/19	Tuesday	SBT	1863	3	ST	7

**LOCATION 2: INTERSECTION OF US-85/US-18 IN NORTHEASTERN NIOBRARA COUNTY**

Serial	Time	Date	Day	Direction	Placard #	Class	Body Config	Cargo Type
1	7:45	01/06/19	Sunday	NBT	1075	2	ST	6
2	8:31	01/06/19	Sunday	NBT	1993	3	ST	un
3	10:16	01/06/19	Sunday	NBL	1987	3	TT	7
4	11:04	01/06/19	Sunday	SBT	1993	3	ST	un
5	13:41	01/06/19	Sunday	SBT	1863	3	TT	7
6	8:20	01/07/19	Monday	EBR	1987	3	TT	7
7	9:30	01/07/19	Monday	NBT	1863	3	TT	7
8	10:05	01/07/19	Monday	NBL	1987	3	TT	7
9	10:15	01/07/19	Monday	NBL	1987	3	TT	7
10	10:28	01/07/19	Monday	EBR	un	3	ST	8
11	11:05	01/07/19	Monday	NBL	1987	3	TT	7
12	11:45	01/07/19	Monday	NBL	1987	3	TT	7
13	13:23	01/07/19	Monday	EBR	un	2	TT	8
14	13:33	01/07/19	Monday	NBL	1203	3	ST	un
15	14:48	01/07/19	Monday	SBT	3414	6.1	TT	un
16	15:33	01/07/19	Monday	EBR	1203	3	ST	un
17	15:38	01/07/19	Monday	EBR	1203	3	TT	7
18	16:09	01/07/19	Monday	EBR	1075	2	ST	5
19	16:23	01/07/19	Monday	NBL	1863	3	ST	un
20	7:27	01/08/19	Tuesday	EBR	1075	2	ST	un
21	8:15	01/08/19	Tuesday	NBL	1075	2	TT	5
22	8:45	01/08/19	Tuesday	NBL	1203	3	ST	un
23	9:43	01/08/19	Tuesday	NBL	1993	3	TT	6
24	9:57	01/08/19	Tuesday	NBL	1075	2	ST	5
25	10:16	01/08/19	Tuesday	SBL	1993	3	TT	un
26	10:24	01/08/19	Tuesday	EBR	1203	3	ST	un
27	10:38	01/08/19	Tuesday	NBL	un	10	TT	8
28	10:41	01/08/19	Tuesday	NBL	1993	3	TT	un
29	10:45	01/08/19	Tuesday	NBL	1075	2	TT	5
30	10:55	01/08/19	Tuesday	NBL	1987	3	TT	7
31	11:05	01/08/19	Tuesday	EBR	1203	3	TT	7
32	11:41	01/08/19	Tuesday	SBT	1203	3	TT	7
33	13:10	01/08/19	Tuesday	NBT	1203	3	ST	8
34	13:20	01/08/19	Tuesday	NBT	1203	3	TT	7
35	14:22	01/08/19	Tuesday	NBL	1203	3	ST	7
36	15:18	01/08/19	Tuesday	SBT	1075	2	ST	5
37	15:40	01/08/19	Tuesday	EBR	1075	2	TT	5
38	15:45	01/08/19	Tuesday	EBR	1993	3	TT	6