Clark County LEPC

http://www.cresa911.org/lepc

To serve the communities and the environment of Clark County through Accident Prevention, Emergency Preparedness, Education, Training and Communication relating to hazardous materials.

2005 Hazardous Material Commodity Flow Study

Final Report

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PREFACE

A Hazardous Materials Commodity Flow Survey (HMCFS) is designed to provide data on the flow of hazardous materials by mode of transport. This HMCFS was conducted to determine the quantity and type of hazmat commodities being transported in and out of Clark County that could affect susceptible populations and impact the environment. The transport of hazardous materials and hazardous waste was the focus of the HMCFS. Areas identified in the study included proximity to critical infrastructure, vulnerable populations and traffic routes.

Transportation planning and decision making, energy use, safety risk and environmental concerns use data from a CFS. An understanding of the risks associated with the transportation of hazardous commodities enables federal, state and local officials to make more informed decisions on resource allocations and procurement, planning, and preparation. A CFS can also assist in determining emergency response capabilities to include resources, personnel, and training.

It is my hope that Clark County emergency responders, planners, school officials, private business owners, and others will use this information to assist in building their response plans; in this way they can adequately mitigate and/or prepare to protect and save the lives, environment, and property of Clark County.

Please review this preliminary report and provide any feedback or suggestions on additional conclusions, graphs or maps you would like added, or any revisions you would recommend.

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Acknowledgements

This project was accomplished through the efforts and hundreds of volunteer hours of the persons below and several volunteer citizens from the community in Clark County. Without the participation of these persons, this project would not have been possible and the Clark County Local Emergency Planning Committee is grateful to them.

De Ann Wilson, Emergency Management Volunteer, Clark Regional Emergency Services Agency – Volunteer Coordinator, Data Collection and Compilation

Deborah Needham, Emergency Management Coordinator. Clark Regional Emergency Services Agency – Personnel Management, Grant Management, Data Compilation, Clark County Statistics and Emergency Resource

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Steve Kahl
Wayne Philips
John Wetzel

Washington State University – Study methodology information and design guidance

INTRODUCTION
JUSTIFICATION FOR COMMODITY FLOW STUDY

According to the U.S. Department of Transportation's *Guidance for Conducting Hazardous Materials Flow Surveys*, the primary purpose of a commodity flow study is "to identify the types and amounts of commodities transported through a specified geographic area, such as a single community, a state, or large urban area, and the routes used for transporting these commodities."[1] By identifying the chemicals being transported and their routes, commodity flow studies help communities to better understand the flow of hazardous materials in their area; this information is useful when analyzing current traffic patterns, matching planning programs to existing needs within communities, and reducing the potential for releasing incidents to occur.[2]

Two sections of the Federal hazardous material transportation law (Federal hazmat law) have increased the interest in and scope of commodity flow studies. Under section 49 U.S.C. 5101 et seq. (formerly the HMTA, 49 App. U.S.C. 1801 et seq.), states are eligible to apply for grants to address "transportation related risks in emergency response planning"[3] and to fund training for emergency responders. Secondly, states are now authorized to designate highway routes that may be used in the transport of hazardous materials. In order to effectively designate these routes, an analysis of commodity flows should be performed so that planners can assess the risks associated with hazardous materials transportation within their jurisdiction. Both pieces of legislation lay the groundwork for the increasing use of commodity flow studies to analyze transportation-related hazardous materials risks and to ensure community preparedness.

Furthermore, the Washington Administrative Code (WAC 118-30-060(1)) "requires each political subdivision to base its comprehensive emergency management plan on a hazard analysis."[4] As part of the analysis, incidents are assigned a probability-of-occurrence, vulnerability, and risk rating. Risk ratings are assigned "on the probability of a hazard recurring over the next 25 years." [5] Hazardous materials spills have been classified as high in both probability and risk rating and moderate in vulnerability. A high probability-of-occurrence suggests that there is great likelihood that a hazardous event will occur within the next 25 years. The definition of a medium vulnerability incident states that "the total population, property, commerce, infrastructure and services of the county

[1] DOT Guidance for Conducting Hazardous Materials Flow Surveys
[2] DOT Guidance for Conducting Hazardous Materials Flow Surveys
[3] DOT Guidance for Conducting Hazardous Materials Flow Surveys
[4] Clark County HIVA
[5] Clark County HIVA

are exposed to the effects of a hazard of moderate influence."[6]The high risk rating indicates that "major program effort is needed to prepare for, respond to, recover from and mitigate against the hazard."[7]

In fact, Clark County has an active history of hazardous materials spills, both by transporters as well as by fixed facilities. According to the Washington State Department of Ecology, Clark County experienced a significant number of hazardous materials spills in each year of the past 10 years. This does not include the number of spills which were not reported to the State.

Year	Reported spills in Clark County
1995	95
1996	149
1997	136
1998	123
1999	217
2000	284
2001	416
2002	341
2003	356
2004	392

In 2005, the Clark County Local Emergency Planning Committee (LEPC) received a Hazardous Materials Emergency Planning grant from the Washington State Emergency Management Division to conduct and prepare a Commodity Flow Study for Clark County, Washington. Additional funding was secured through the Emergency Management Performance Grant from Washington State. Using community volunteers, paid staff and the Clark Regional Emergency Services Agency (CRESA), the study was conducted as a roadside survey whereby truck data (e.g., placard type, UN/NA commodity number, route used, truck type) was recorded and later entered into a database. Additional information was obtained on railway and pipeline transportation of hazardous materials through records requests with the individual transport companies.

[6] Clark County HIVA
[7] Clark County HIVA

PURPOSE

Upon completion of the commodity flow study, Clark County planners will have a better understanding of hazardous materials transportation patterns and can use this data to estimate risks facing the jurisdiction and adjust plans accordingly. Given the objectives of the study and the resources and time available, the information obtained in this commodity flow study can be used to assess total truck traffic, daily variations in traffic, frequently used transportation routes, and the vulnerability of critical infrastructure relative to known hazmat transportation routes.

The information listed below was gathered to generate the hazardous materials commodity flow study:

- Major traffic corridors used
- Primary hazard classes transported
- Number of hazardous materials trucks
- Percentage of hazardous materials traffic in all truck traffic
- Truck types used for hazardous materials
- Peak transportation times and days

Once hazardous materials moving through the county have been identified and analyzed, a final copy of this report will be provided to emergency response agencies and to the Clark County Local Emergency Planning Committee (LEPC). As such, it will serve as a planning and training tool by providing information about the areas most likely to experience a hazardous materials incident and the types of chemicals that could potentially be involved. This report will also be used to help the LEPC in the annual process of updating the Hazardous Materials Emergency Response Plan.

METHODOLOGY

Data for the commodity flow study was collected through visual observations and from information provided by public agencies. Using as a starting point the 1998 CFS, major roads were identified and transportation patterns analyzed. The previous CFS included data from Interstate 5 (north and south) and Fourth Plain Blvd., the routes most heavily used to transport hazardous materials at that time.

Since 1998, Clark County has experienced a significant increase in population. According to the Clark County Department of Assessment & GIS, the population has increased from an estimated 324,000 residents in 1998 to 383,000 in 2004 – an increase of 18.2 percent in six years. Most of this increase has occurred in the eastern portion of the county in cities such as Camas and Washougal. To account for this pattern of growth, the LEPC included additional east-west transportation routes including SR 500, SR 14 and Mill Plain Blvd. in this study. Additional considerations when determining routes to include were proximity to the Columbia River (SR 500 & SR 14), changes in road conditions (the Mill Plain Blvd. extension completed in 2001, which created a new route to the Port of Vancouver running within one block of the city and county government seats and two blocks of the federal government building) and major changes in industry (the opening of Legacy Salmon Creek Hospital off of I-205). Given these considerations, the routes chosen for inclusion in the 2005 CFS were:

Mill Plain Boulevard Westbound at Kauffman	Mill Plain Boulevard Eastbound at Kauffman
Mill Plain Boulevard Eastbound at Lieser Road	Mill Plain Boulevard Westbound at Lieser Road
Fourth Plain Boulevard Eastbound at Kauffman	Fourth Plain Boulevard Westbound at Kauffman
I-5 Northbound in Ridgefield	I-5 Southbound in Ridgefield
I-205 Northbound in Vancouver	I-205 Southbound in Vancouver
SR-14 Eastbound at Ellsworth exit	SR-14 Westbound at Ellsworth exit
SR 500 Eastbound at Falk	SR 500 Westbound at Falk
I-205 Northbound at Mill Plain	I-5 Southbound at Clark County Fairgrounds
I-205 Southbound at SE 10th	I-205 Northbound at SE 10th

Eight community volunteers were utilized as much as possible during the survey, and were ultimately responsible for approximately one third of the truck observations over two months. Once additional grant funding was secured, seventeen paid observers were hired to complete an additional month of observation. Wearing orange safety vests, observers recorded all trucks moving through the transportation route and recorded placard data from those containing

hazardous materials onto a survey sheet. Although there are no agency disclosure or recording requirements for the commercial transport of hazardous materials, companies are required to label the type or specific kind of hazardous material with an identifying placard. Information collected by the observers included the total number and types of trucks, the total number of trucks transporting hazardous materials and the number and/or symbol on the placard for those classified as hazmat.

As survey sheets were completed and submitted to Clark Regional Emergency Services Agency (CRESA), volunteers tallied the truck count, added corresponding guide and hazard class numbers to the placards noted for each observation period and entered the information into a computerized database. This database was used to create the reports and charts provided in this commodity flow study analysis.

Information was also requested from Burlington Northern Santa Fe Railroad, the Williams Pipeline, and the BP/Olympic Pipeline regarding their hazardous materials and transportation, Due to the sensitive nature of some of the data provided and their vital role as critical infrastructure of Clark County, only a limited analysis of their data will be presented.

LIMITATIONS

The use of human observers always creates limitations in that it is difficult to see detailed information about fast moving traffic. Related concerns voiced by paid and volunteer observers at a post-survey feedback session included the following information: multiple placards on a single vehicle were difficult to record during traffic flow, the black and silver placards on tankers were difficult to read, paint trucks were inconsistently placarded, and Burlington Northern Santa Fe (BNSF) service trucks at times used manufacturers' shipping labels instead of placards. Survey planners attempted to overcome some of these limitations by posting two observers at each site during every shift where possible. Where traffic was lighter, two observers could observe both directions of travel simultaneously. It was also noted that, although letters introducing the study were sent to law enforcement agencies prior to implementation, two observers were asked to leave their data collection posts by police during their shifts. The reasons for this are twofold; traffic appeared to be backing up as drivers slowed to look at the observers, and not all law enforcement officials received or took note of the memo regarding the study. Additionally, several others were questioned based on law enforcement perception of suspicious activity (observing traffic with binoculars from overpasses). Other than the two who were asked to discontinue their shift, all other observers were allowed to continue their work once they provided identification and authorization letters.

An additional possible hazardous material route was identified toward the end of the data collection period; through discussions with truck drivers and locals it was discovered that an additional route may be used by truckers to access I-5 from the Port of Vancouver. It is recommended that the route from I-5 to the Port of Vancouver using Fruit Valley Road to 78th street be added into the next Commodity Flow Study.

In addition, this report only contains information regarding regulated hazardous materials as identified by the Environmental Protection Agency. Other types of cargo, including food products and by-products and animal wastes could present hazards and are not included in the scope of this study.

SUMMARY OF FINDINGS

Results indicated that approximately 2.72 percent of the truck volume moving through the county is carrying hazardous materials, compared with 3.73 percent reported in the 1998 CFS.*(see below) In total, 115,858 trucks were counted of which 2,619 were placarded as carrying hazardous materials. The days of the week with the heaviest amount of hazmat traffic are Wednesday (21 percent) and Friday (20 percent); Monday (18 percent), Tuesday (17 percent) and Thursday (18 percent) all experienced almost equal amounts of hazmat traffic (see Graph 1).

As with the 1998 CFS, results show that flammable and combustible liquids are the most heavily transported hazardous material in Clark County, with 1138 placards counted. Corrosives were the second highest class at 553 placards and gases were the next most common class with 451 placards counted. (See Graph 3)

Within the flammables class, gasoline was the most common placard; approximately 63 percent of the flammables being transported were gasoline. Combustible liquids were also a significant portion of the flammables category, accounting for approximately 14 percent of the flammables moving through the Clark County area.

Corrosives, the second most common hazardous materials class transported through the county, consisted of both acids and bases. Sodium hydroxide solution was the most common corrosives placard recorded, with 33.8 percent of the total category; hypochlorite solutions, corrosive liquids/ acidics/inorganics, and sulfuric acid (with more than 51 percent acid) also had significant placard counts at 10.5 percent, 9.2 percent and 9 percent respectfully. These specific corrosives are consistent with the electronics and semi-conductor industry common throughout Clark County.

The gases classification (Class 2) is broken into Divisions based on the properties of each gas. The data collected on each Division is detailed in the following chart:

Gas Division	Description	Number placards counted
2.1	Flammable gases	207
2.2	Non-flammable, non-toxic compressed gases	232
2.3	Gases toxic by inhalation	12

* The reason for difference in the percentage of hazmat vs. total traffic between the 1998 and 2005 studies may be that he 1998 CFS focused the majority of observations on I-5. The 1998 to 2005 may not represent a valid comparison.

The most common gases were liquid petroleum gases at 41.2 percent, carbon dioxide (refrigerated liquid) at 11.5 percent and nitrogen (refrigerated liquid cryogenic liquid) at 10.6 percent.

Miscellaneous dangerous goods are another significant class of hazardous materials moving through Clark County, comprising 9.5 percent of the total hazmat trucks counted in the CFS. This class has a variety of components including environmentally hazardous substances and dangerous wastes, which would again be consistent with the electronics and semi-conductor industry prevalent in Clark County.

Oxidizers and organic peroxides, used in both agriculture and in the electronics industry, accounted for 1.79 percent of the total hazardous materials transported throughout the county.

Toxic materials and infectious substances are also moving through Clark County, totaling 43 placards or 1.64 percent.

One subjective finding reported by several observers was that truck traffic in many cases were moving faster than other traffic, and in excess of the posted speed limits on the highways. Although overall speed of traffic was not assessed in this study, this finding raises a safety concern when considering the dangerous nature of some of the materials being transported.

DATA ANALYSIS BY LOCATION

Mill Plain Blvd. East and West at Kauffman (Graphs 5 & 6)

As shown in Graphs 5 and 6, the greatest risk for a hazardous chemical release along Mill Plain Blvd. is flammable and combustible liquids. These hazardous materials accounted for 41 percent of the hazmat flowing westbound and 44 percent of the eastbound traffic. Corrosive materials are also a major hazmat source on Mill Plain Blvd., accounting for more than 24 percent of the hazardous materials transported on this route in both directions.

As mentioned earlier in the report, an extension to Mill Plain Blvd. was completed in 2001 and much of the traffic flow to the Port of Vancouver has since been re-routed from Fourth Plain Blvd. This route is also a critical one because of its proximity to city, county and federal buildings and because it is located close to three health and medical centers (see Schools and Medical Centers in Clark County map).

Mill Plain Blvd. East and West at Lieser Road (Graphs 7 & 8)

Mill Plain Blvd. at Lieser Road did not exhibit much hazardous materials traffic, even though observation time at the site was an average 5-6 percent of total observation time in both directions. This portion of Mill Plain Blvd. is a local access point and therefore does not experience the same volume of hazmat traffic as the intersection at Kauffman. As shown in Graphs 7 and 8, total hazmat traffic eastbound during the study was 5 trucks, with 14 total hazmat trucks recorded westbound. In both cases, gases were the most common hazardous material observed.

Fourth Plain Blvd. East and West at Kauffman (Graphs 9 & 10)

Fourth Plain Blvd. East at Kauffman has experienced a clear decline in hazardous materials truck volume since the completion of the Mill Plain Blvd. extension which provides access to the Port of Vancouver. Hazmat truck traffic was much lighter than the numbers observed for Mill Plain Blvd., with total trucks numbering 113 eastbound and 115 westbound, compared with 311 and 182 for Mill Plain eastbound and westbound respectfully. Observation time at this location was between 5 and 6 percent of the total observation time for the study.

Fourth Plain Blvd. still experiences a moderate amount of port traffic, however, with roughly 70 percent of the hazmat in both directions classified as gases. This

is likely the result of existing signage on I-5 and Fourth Plain Blvd. directing traffic to the port and the time required to change existing traffic patterns.

I-5 North and South in Ridgefield and at the Clark County Fairgrounds (Graphs 11, 12 & 20)

Hazmat traffic on 1-5 North and South was very high due to the use of I-5 as a major north-south transportation route. I-5 Northbound observers counted 630 hazmat trucks; Graph 11 illustrates that 35 percent of these were classified as flammable liquids and 26 percent as corrosive materials. Southbound I-5 hazmat truck count was 349; as shown in Graph 12, 37 percent of these observations were flammable liquids and 27 percent were corrosive materials. Graph 20 shows 212 hazmat trucks recorded, with Class 3 at 45 percent and Classes 2 and 8 at 17 percent each. Observation time at this location was 9 percent of total observation time for northbound traffic and 12 percent of total observation time southbound.

I-205 North and South in Vancouver, at SE 10th Street, and at Mill Plain Boulevard (Graphs 13, 14, 17, 21 & 22)

I-205 is a North-South route allows vehicles to access the East side of Vancouver and Portland without having to travel through the downtown corridors of either city. The time spent observing I-205 accounted for over 14 percent of the total, with 5 percent in Vancouver (North and South), .5 percent at Mill Plain Blvd, and 9 percent at SE 10th Street. Hazmat counts followed the trend with Class 3 materials totaling 149; Class 2 at 121, and Class 8 at 84.

SR-500 East and West at Falk (Graphs 18 & 19)

SR 500 is a significant East-West route through Vancouver ending at Fourth Plain Blvd to the East and I-5 to the West. SR 500 runs though both light commercial and residential areas, with a large amount of retail. Observed 13 percent of the total observation time at SR 500 and Falk Road, Class 3 materials were prevalent with fifty-seven trucks, followed by Class 2 with ten trucks, and Class 8, also with ten trucks. Additional four “Dangerous” placards were the only other hazmat labels recorded. This would appear to indicate this is not a major route for most hazmats, but is typical for commercial fueling stations given the count of flammable liquids.

Burlington Northern Santa Fe Rail Road (Graph 23)

Clark County is host to BNSF, which runs along the Columbia River and has a switching yard in Vancouver to route cars to Portland and Seattle. BNSF

provided the LEPC with its 2004 count of hazardous material transports from which the following information is provided.

Rail cars are segregated into two conditions, loaded or residue, and two categories, general “cars” and intermodal cars. Loaded “cars” and intermodals can carry hazardous materials, and are considered loaded when full of product. “Cars”, primarily tank cars, and categorized as “residual” when only 3 to 7 percent of the car’s volume contains product. For emergency responders, this is still a significant volume as 7 percent of an 80,000 gallon tank, is 5,600 gallons. Intermodal cars are not generally used to haul residual materials.

While information about specific products is restricted, the general trend shown on Graph 22, shows that the “ML” category contributes 24.43 percent toward the total volume of hazardous materials. Class 2 materials comprise 22.71 percent, which indicated rail is a major means of transportation for gases of all kinds. Class 9 materials make up 18.27 percent, Class 3 16.82 percent, and Class 8 materials make up 7.45 percent.

Williams Pipeline

The Williams Pipeline running through Clark County only transports Natural Gas. In a majority of the pipeline, the odorant mercaptan has not been injected into the system. Hence, other methods are used by Williams personnel to monitor for leaks. Specific information on volume of flow, or their procedures are not provided in this report, and its mention serves only as a reminder of the existence of the pipeline to various agencies when creating their pans.

BP/Olympic Pipeline

The BP/Olympic pipeline runs though Vancouver and Clark County carrying flammable liquid. Although BP transports the materials, it does not necessarily own the products in the pipeline. The three Class 3 materials vary from gasoline, diesel, and jet fuel. Specific information for volumes or procedures is not provided in this report, and its mention serves only as a reminder of the existence of the pipeline to various agencies when creating their various plans.

Air and Waterway

No information was obtained regarding transport of hazardous materials through Clark County via Air or Water routes.

CONCLUSIONS

Clark County regularly experiences hazardous materials releases, both from transporters as well as from fixed facilities, every year, and the total numbers have been increasing as Clark County continues to grow. The probability of a significant hazardous materials spill in Clark County remains high. The 2005 Hazardous Materials Commodity Flow Study confirms that large quantities of hazardous materials routinely move through the County. It is reasonable to expect that a transportation accident or act of terrorism involving a hazmat carrier could have significant consequences in Clark County.

The hazardous materials transportation routes studied are largely located in the densely populated City of Vancouver area. Depending on the substance involved, environmental factors, and the location of the spill, there could be a substantial and devastating affect on the citizens, infrastructure, and environment of Clark County. A hazmat incident in a densely populated area, or near a vulnerable population, such as a school or hospital, would present serious challenges to emergency responders in their efforts to protect the public. If evacuation were necessary, it would first impact those nearest the incident. Since a sizeable portion of the hazmat transportation routes are located in high density areas, evacuation would be difficult to achieve if large numbers of people needed to be quickly moved out of the area.

This study highlights the importance of enforcing traffic safety laws to ensure that transporters of hazardous materials follow all appropriate safety regulations, including observing posted speed limits, and accurately placarding vehicles to assist first responders in making the best command decisions in an emergency. It also reminds planners to not become complacent. The reality is that hazardous materials are moving through Clark County on a regular basis. Planners should continue to expect that hazardous materials will continue to be a risk within Clark County, and should continue to do everything possible to prevent a major hazmat incident from occurring.

References

2005 Population and Economic Handbook, Clark County Department of Assessment & GIS

Clark County Commodity Flow Study 1998, Clark County LEPC

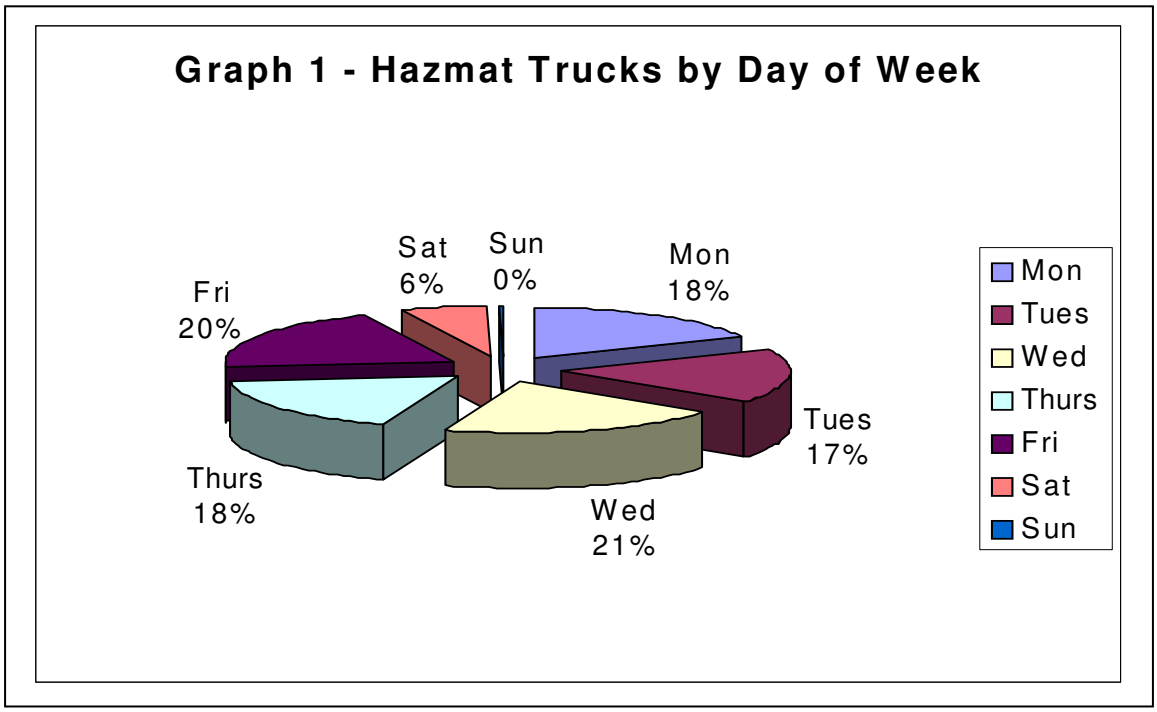
Clark County Hazard Inventory Vulnerability Assessment, Clark Regional Emergency Services Agency

Commodity Flow Survey for Sedgwick County, Kansas

Emergency Response Guidebook 2004 ed., Department of Transportation
Web address: www.dot.gov

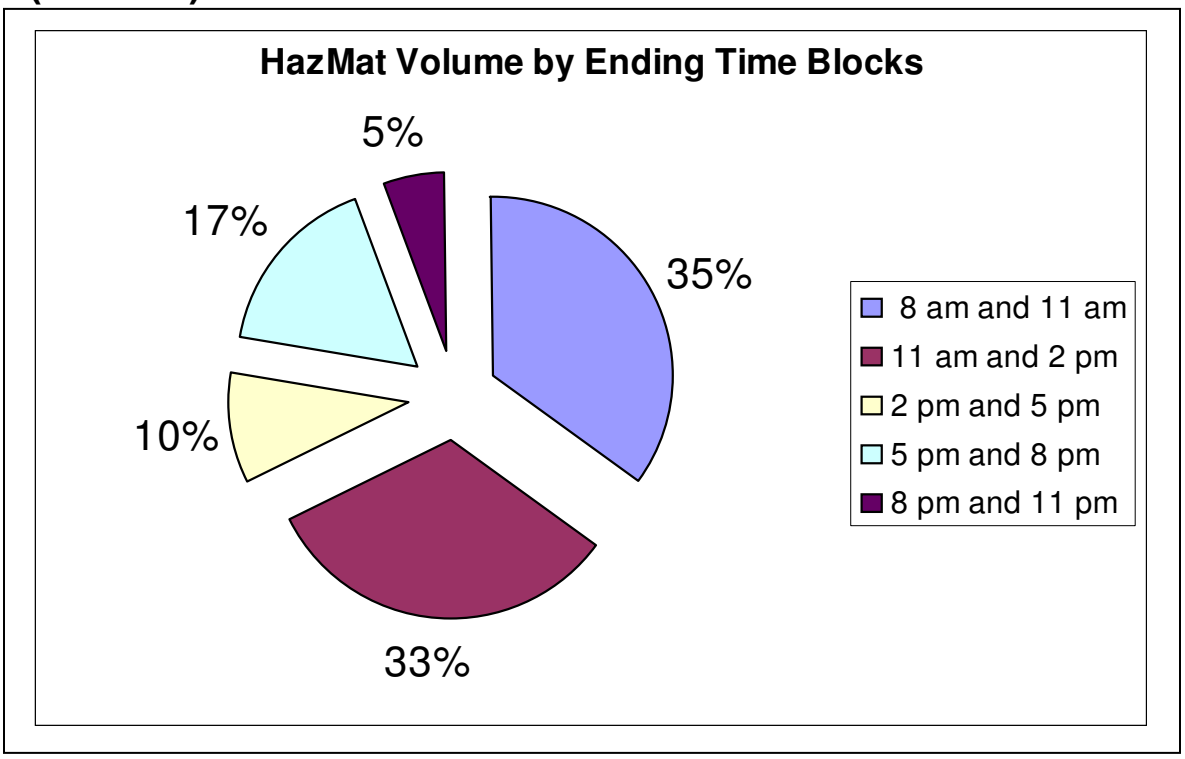
Guidance for Conducting Hazardous Materials Flow Surveys 1995 ed., U.S. Department of Transportation

Graph 1: Hazmat Trucks by Day of Week (No Rail)

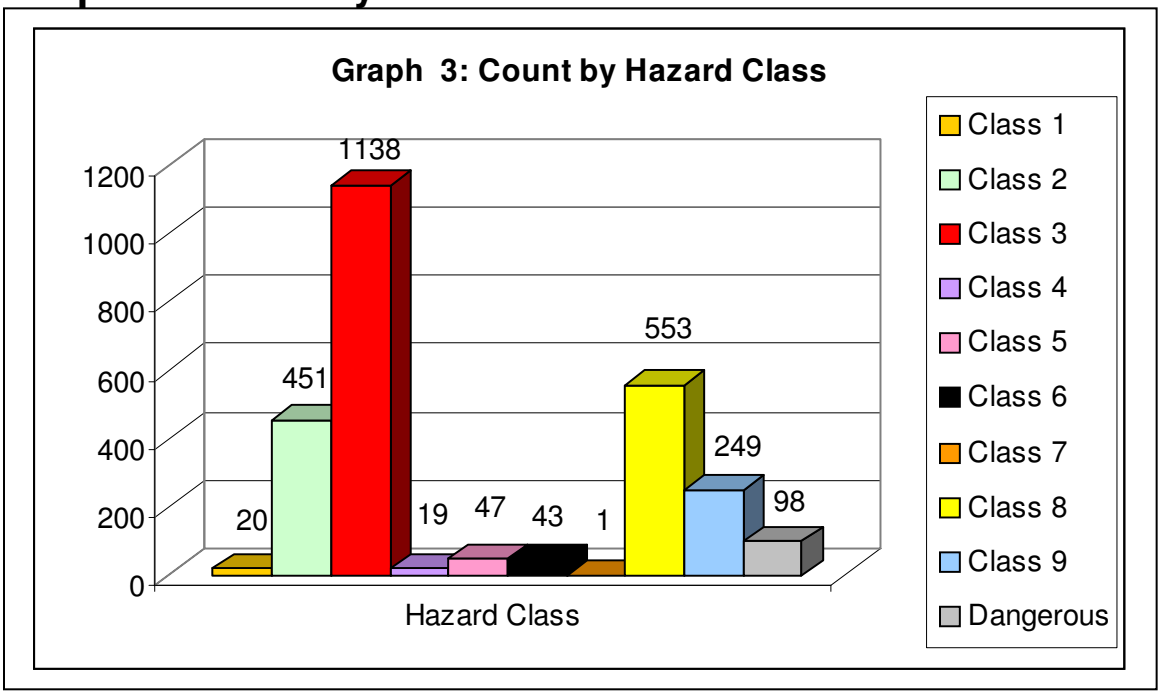


(Note on Graph 1: No observations were conducted on Sundays)

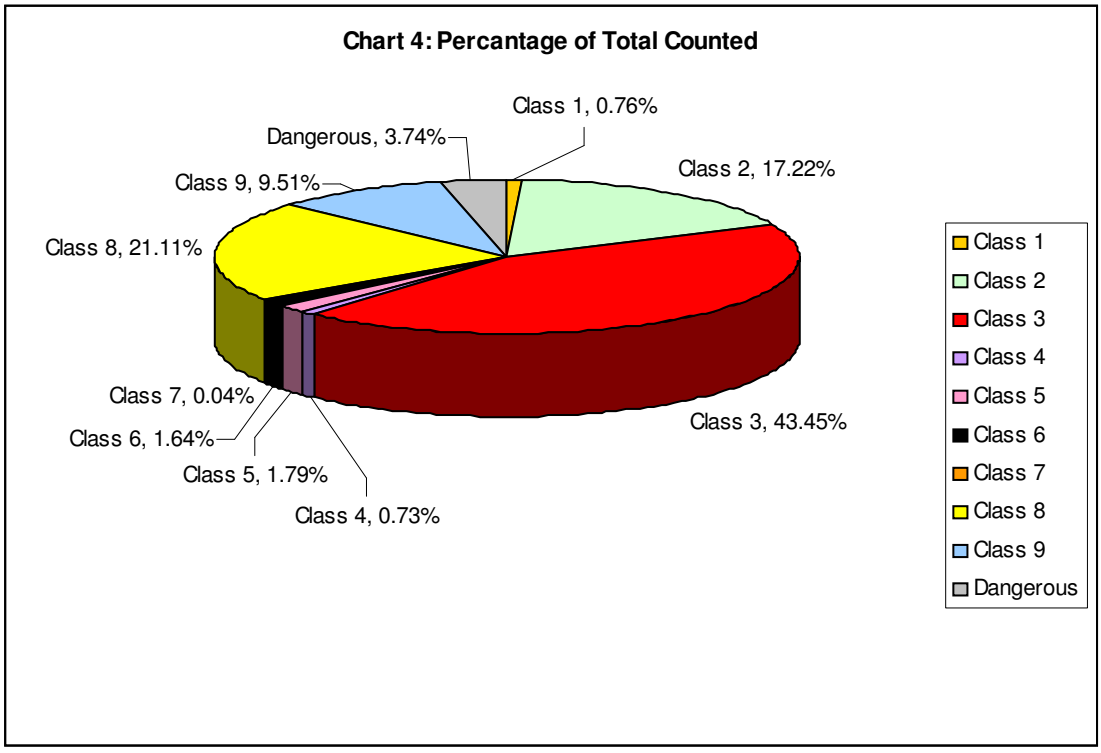
Graph 2: Hazmat Volume by Ending Time Blocks (No Rail)



Graph 3: Count by Hazard Class



Graph 4: Class Percentage of Total Counted



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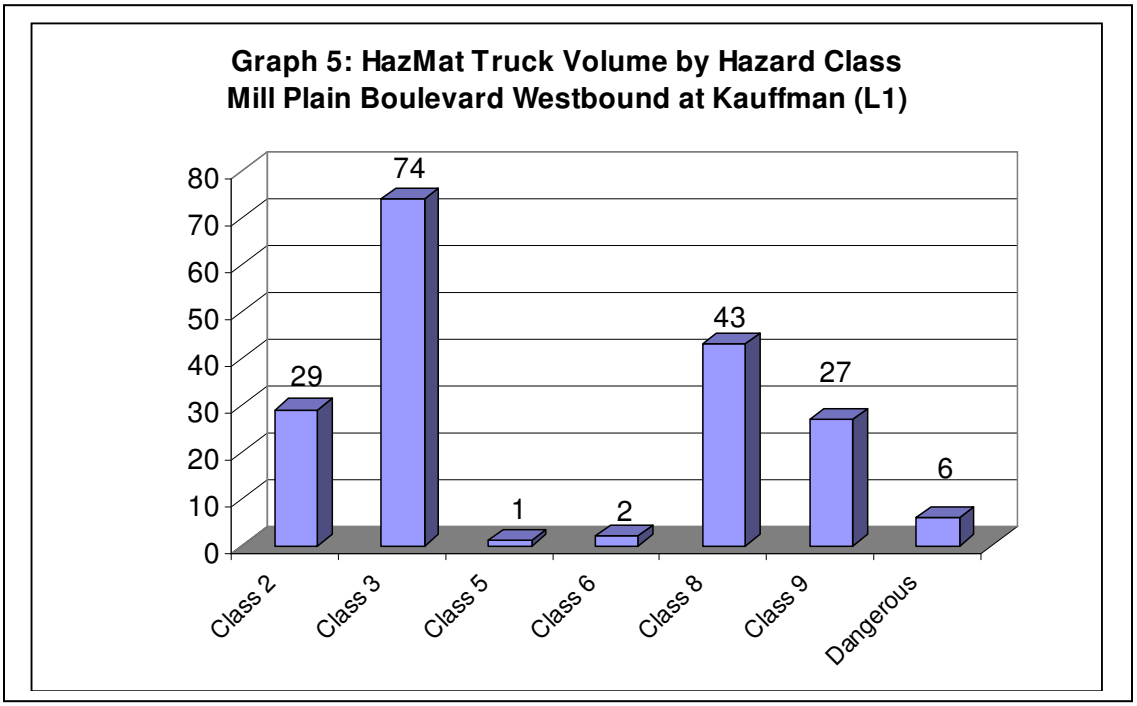

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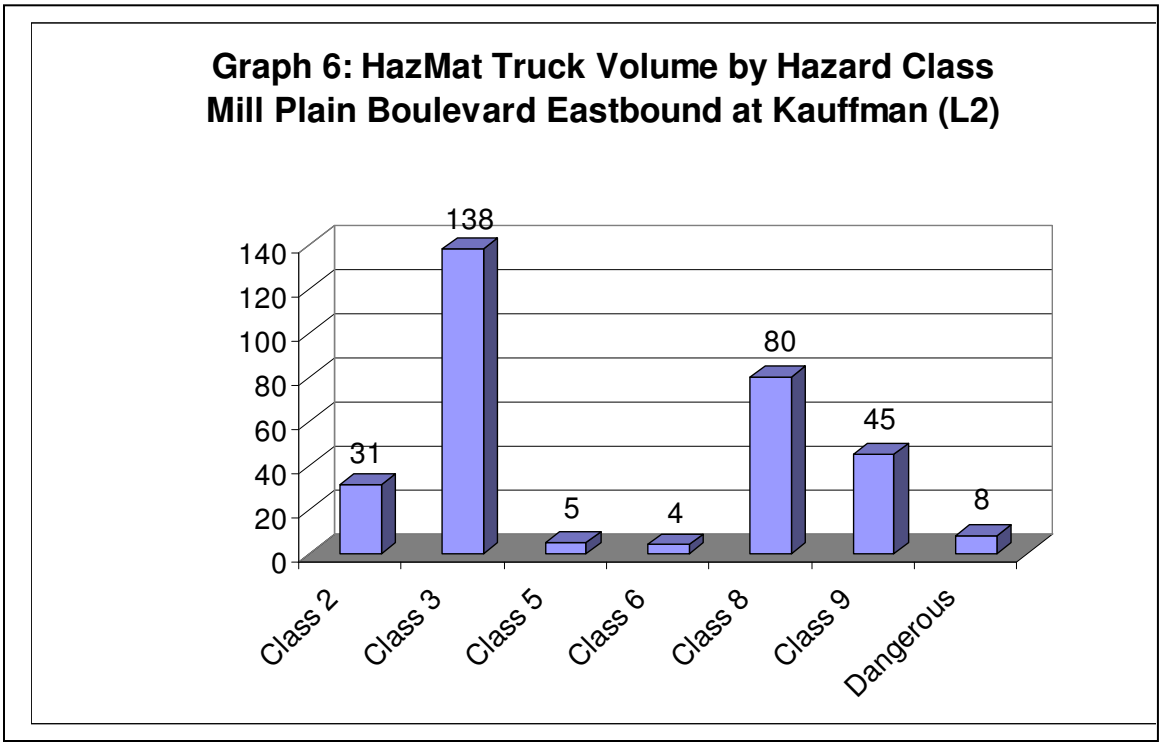

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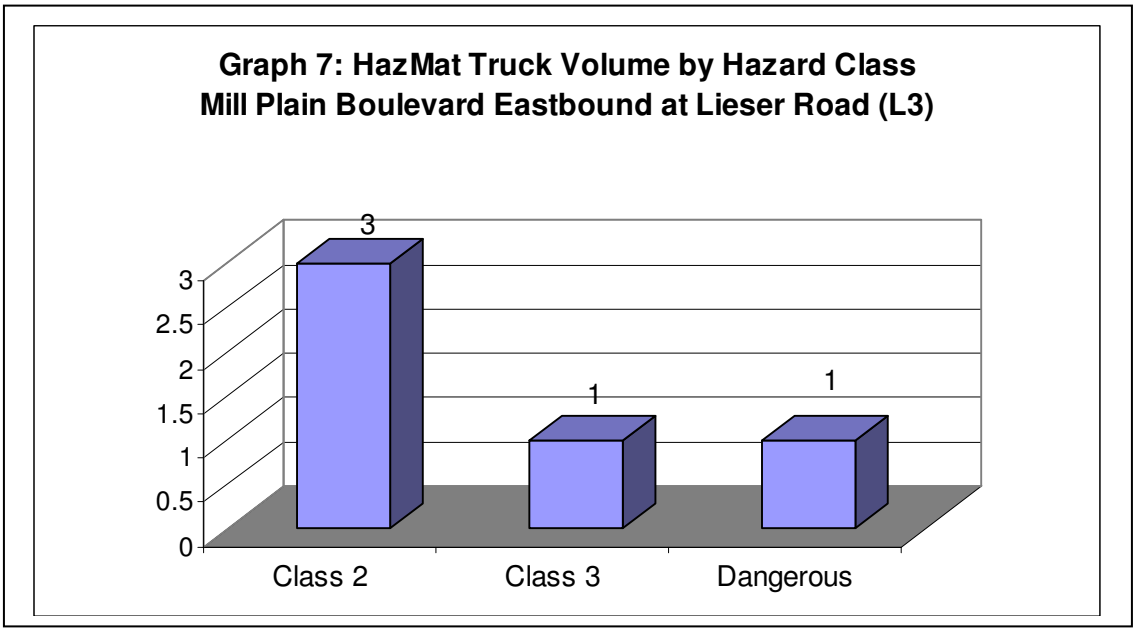

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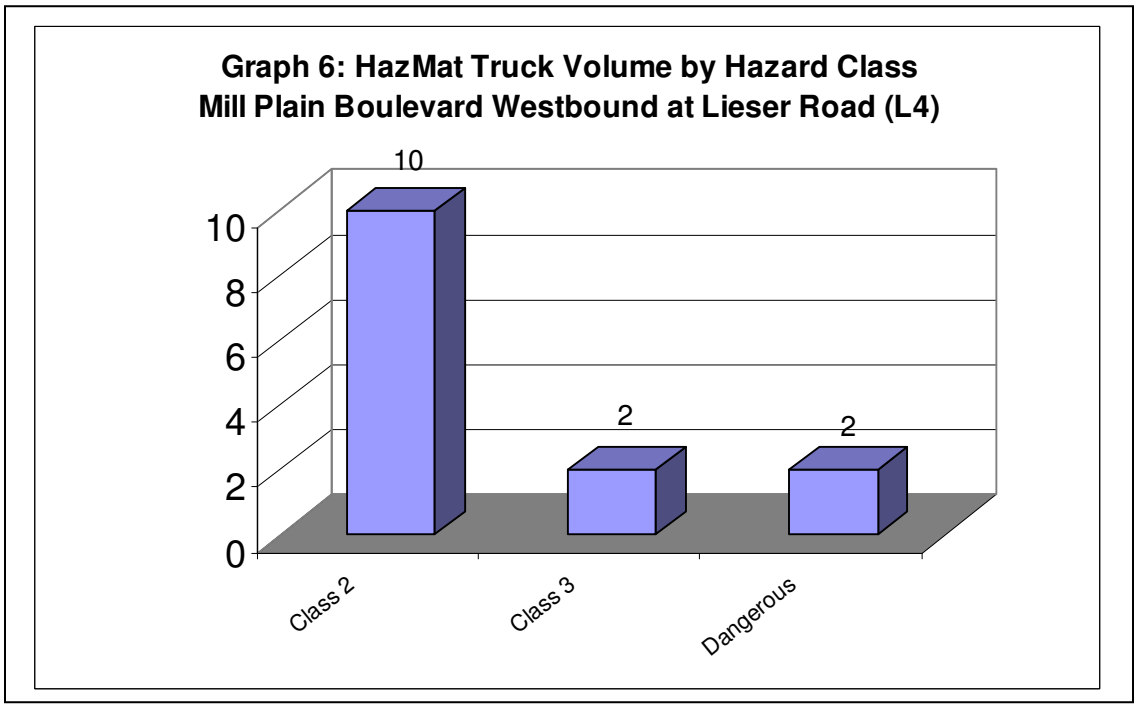

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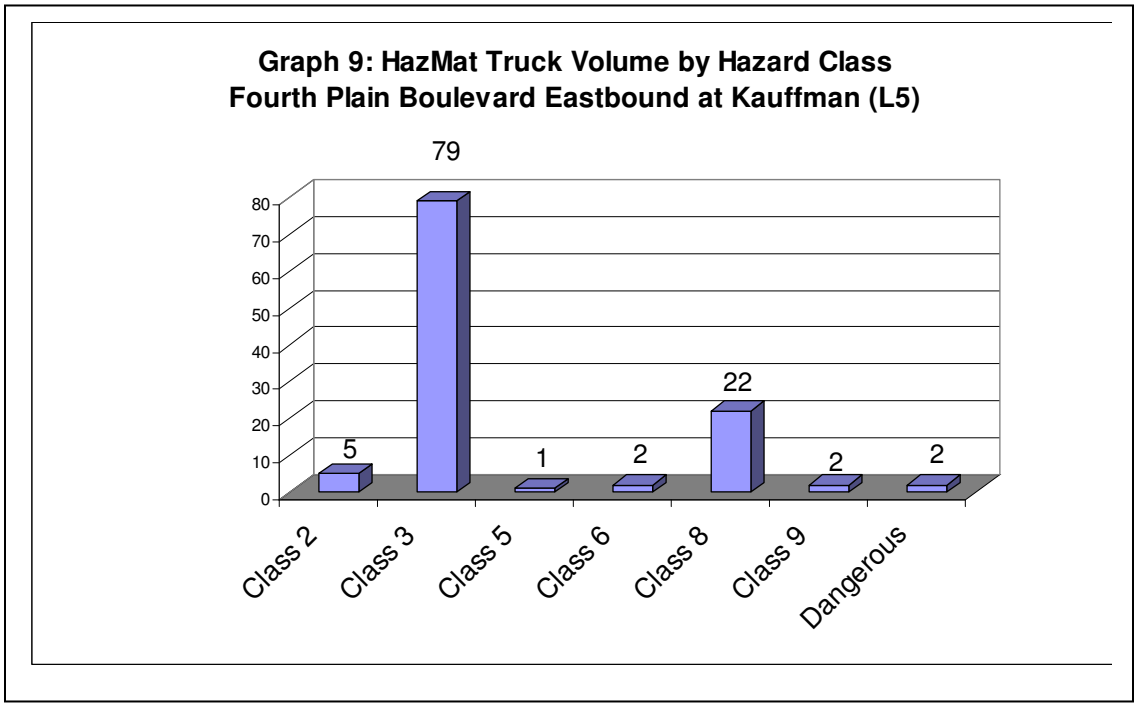

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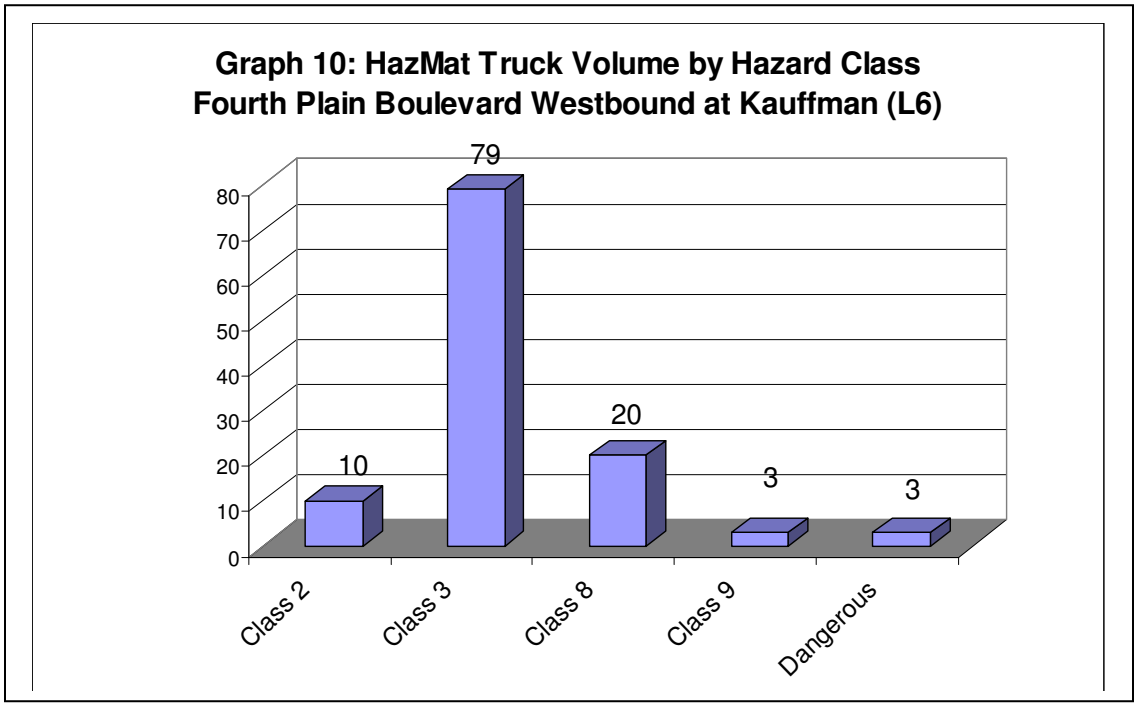
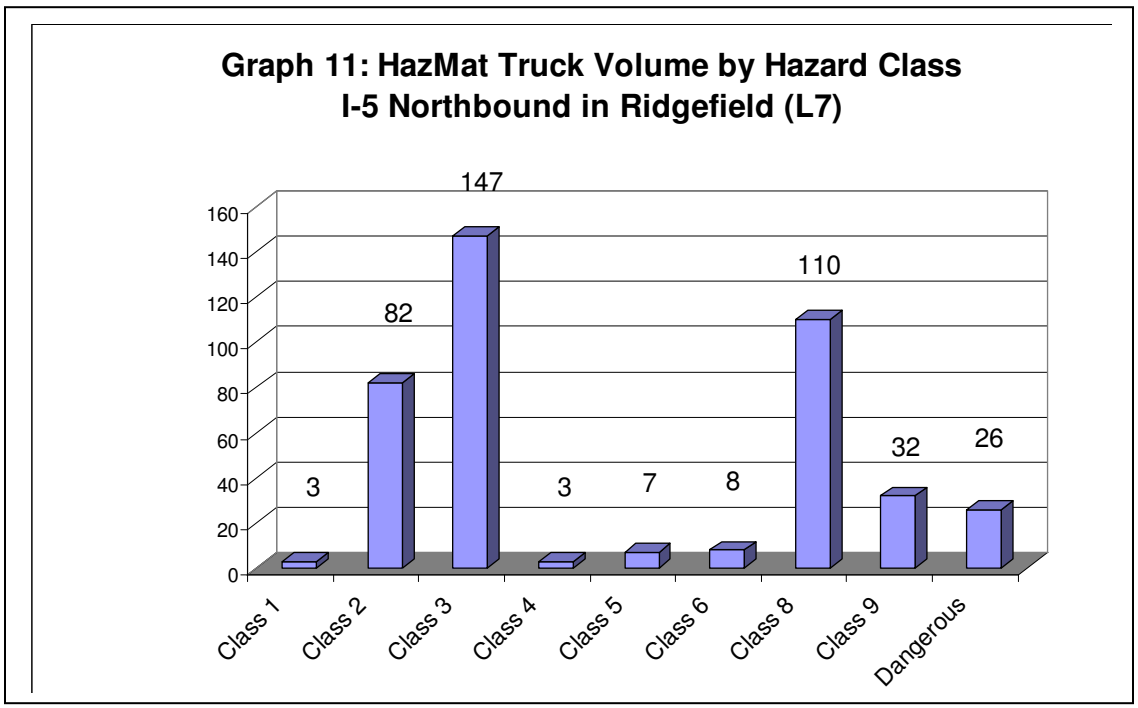


Graph 11:



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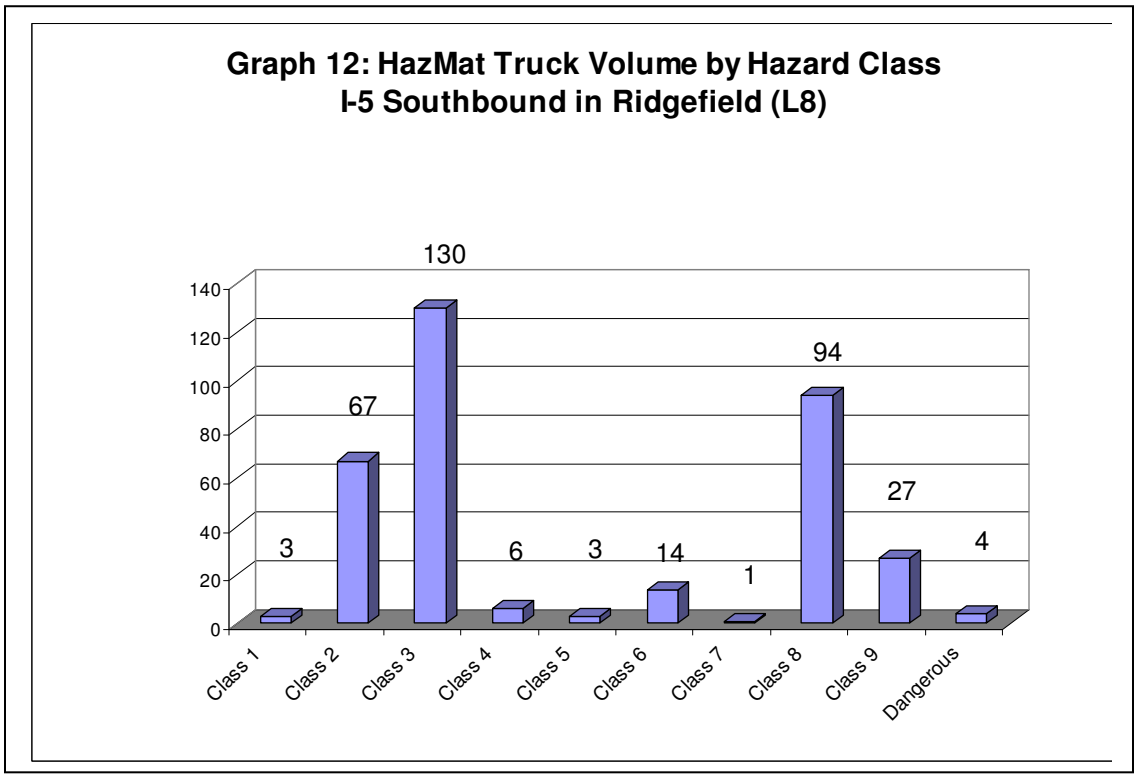

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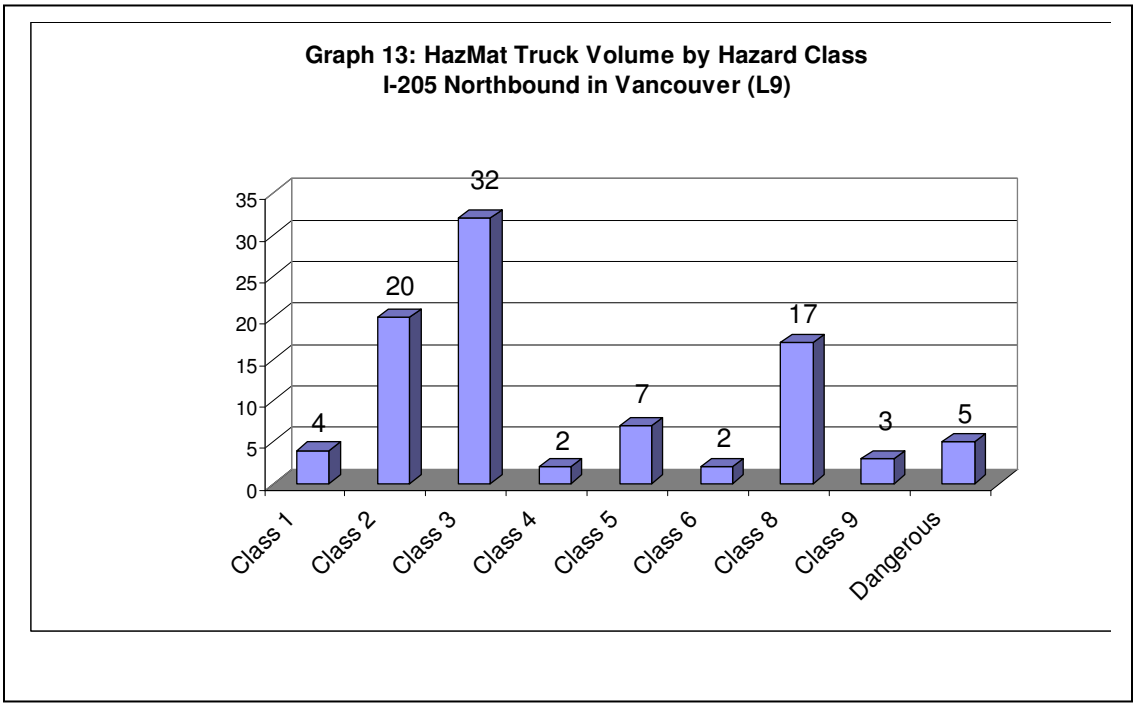

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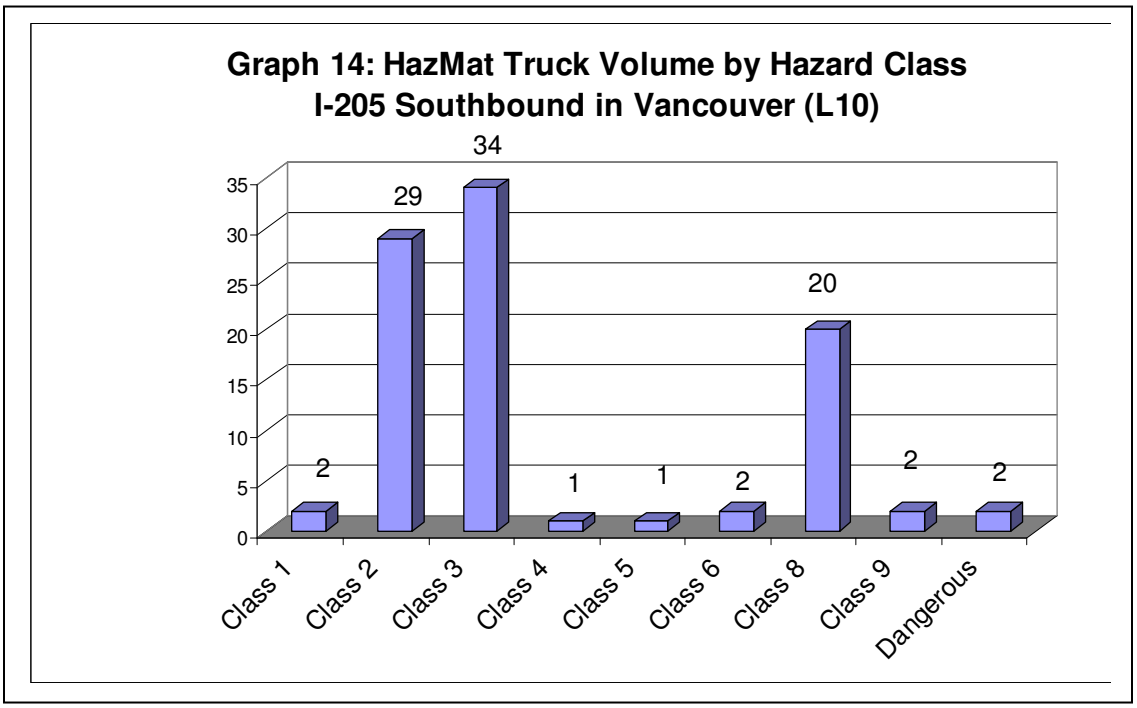

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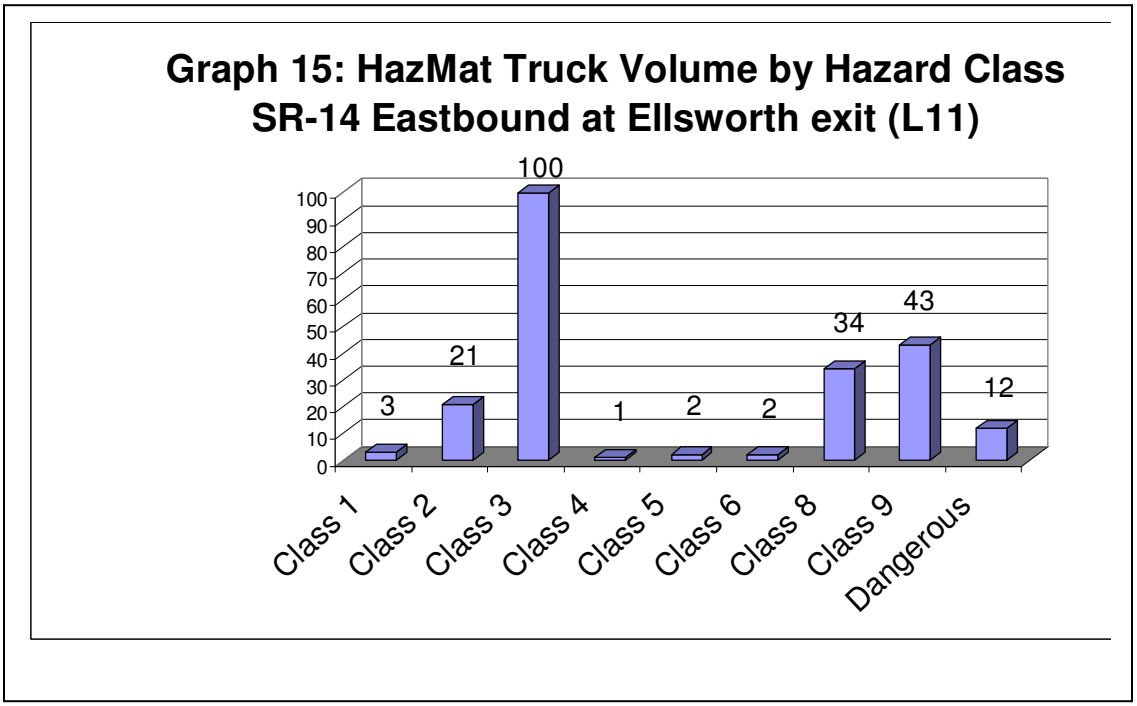
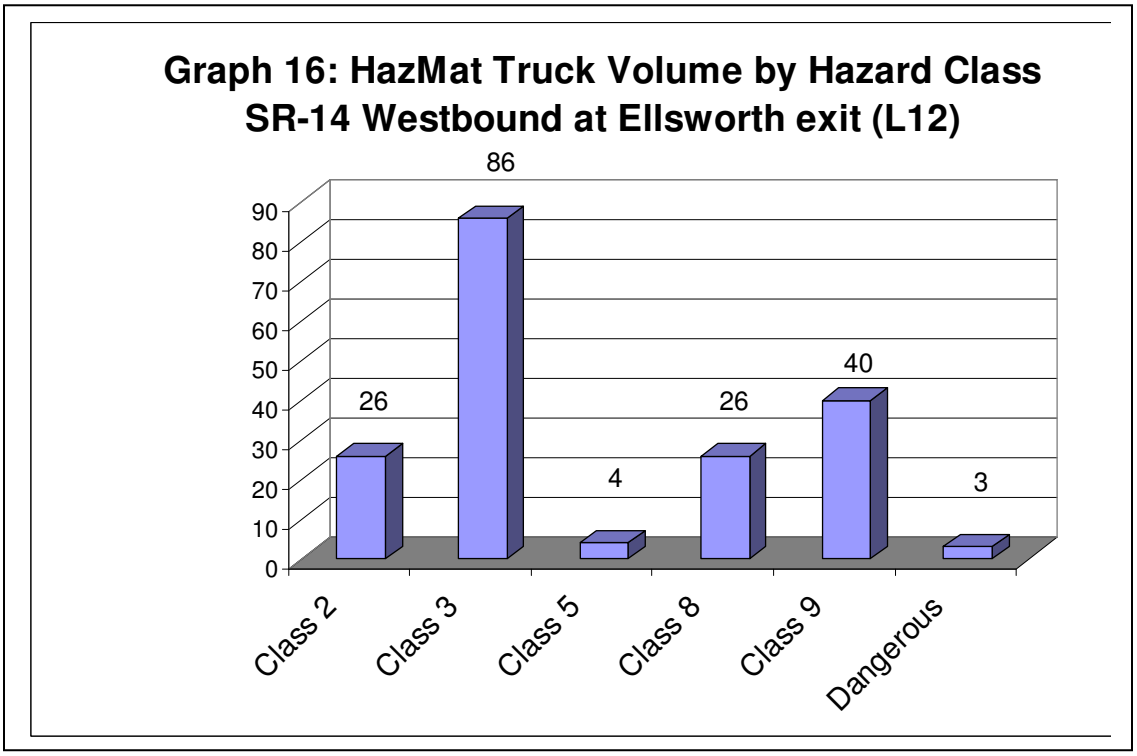
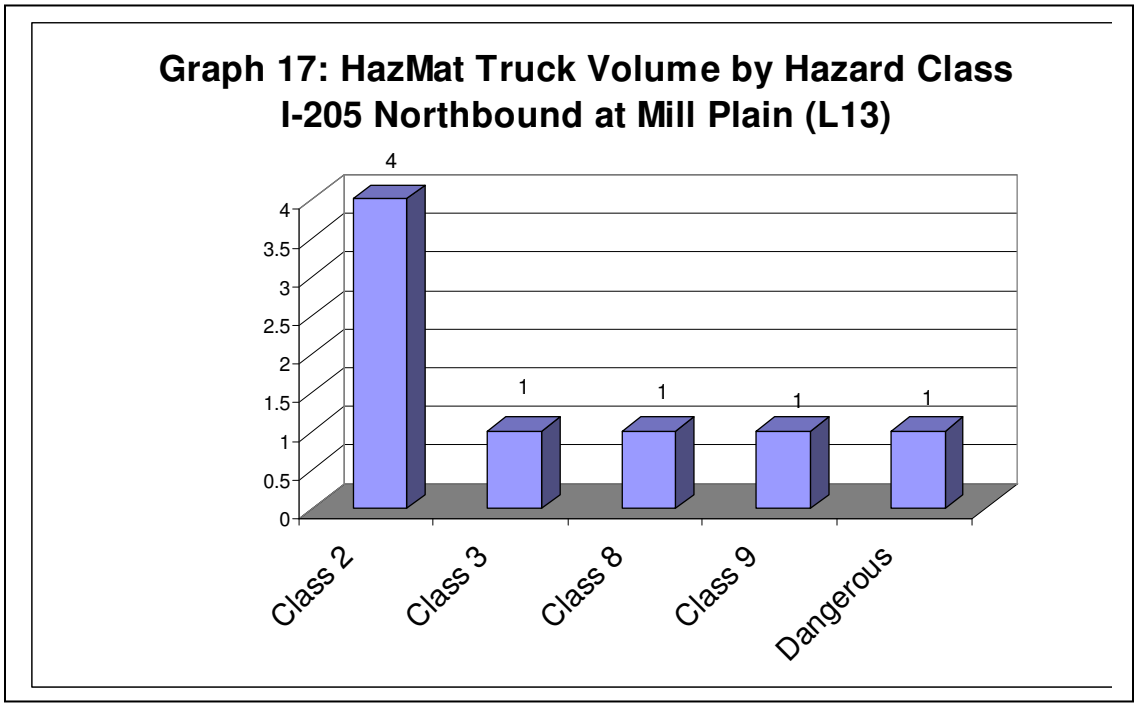


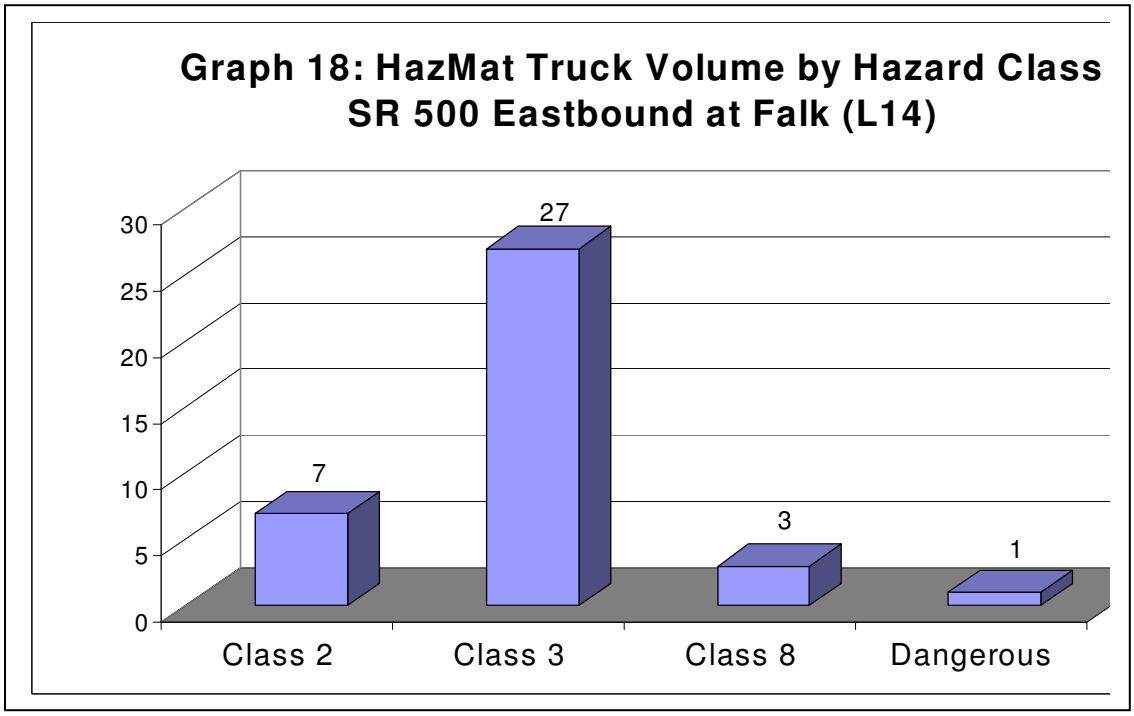
Graph 16:



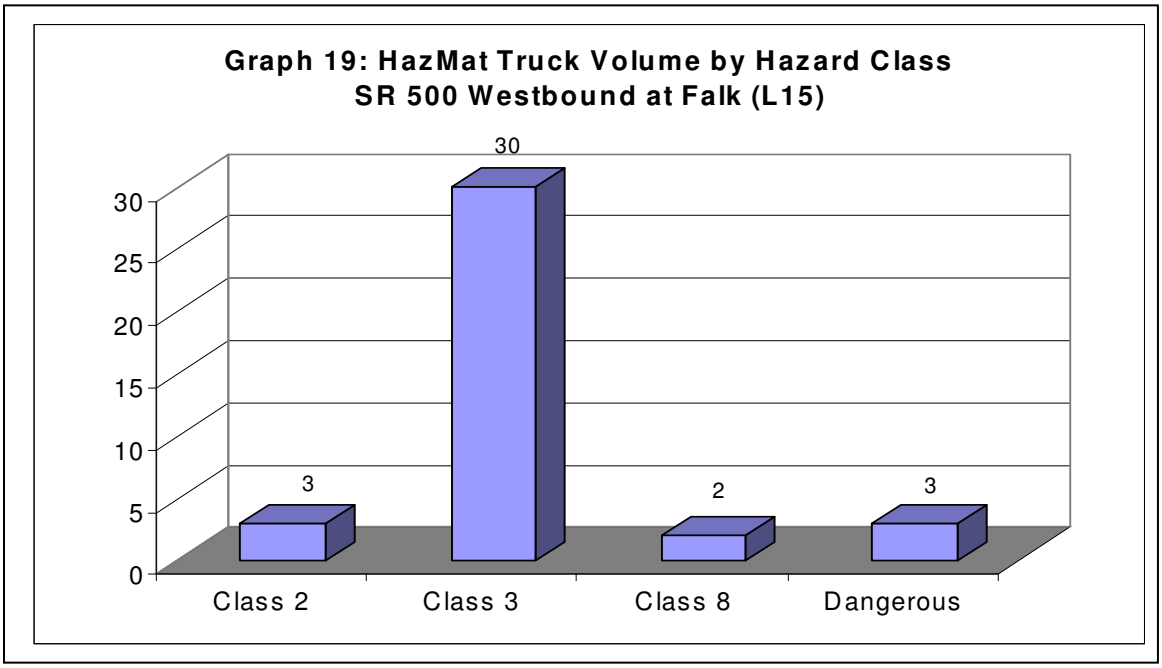
Graph 17:



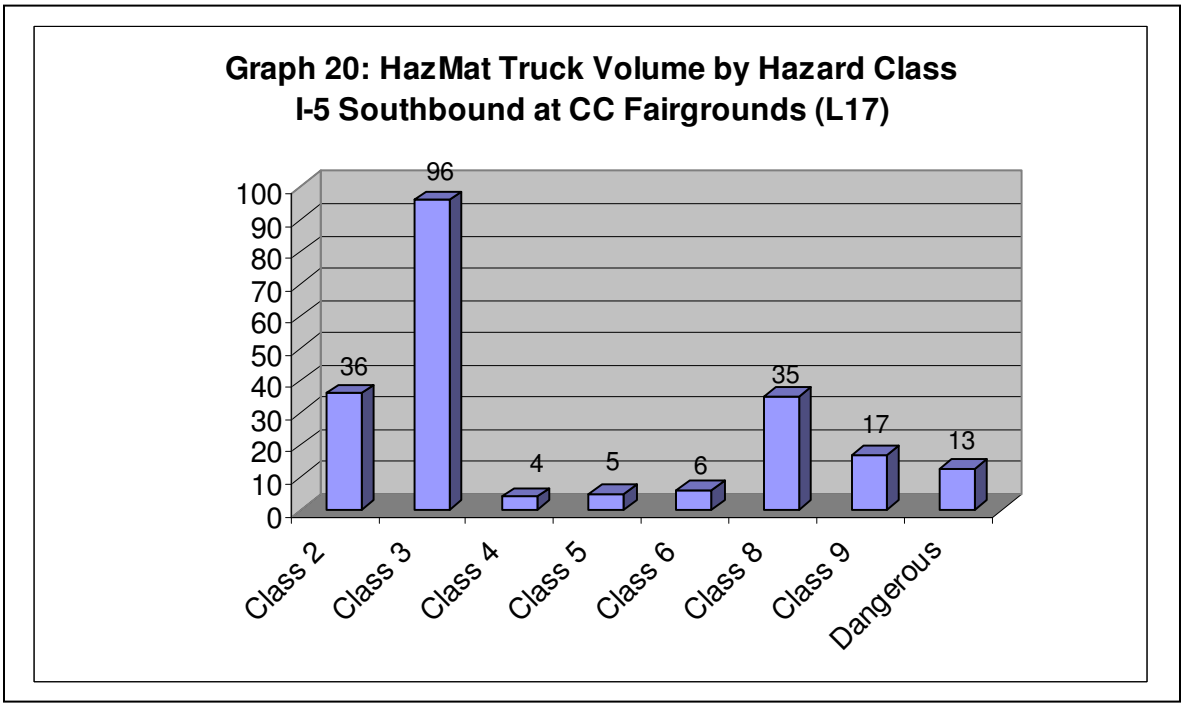
Graph 18:



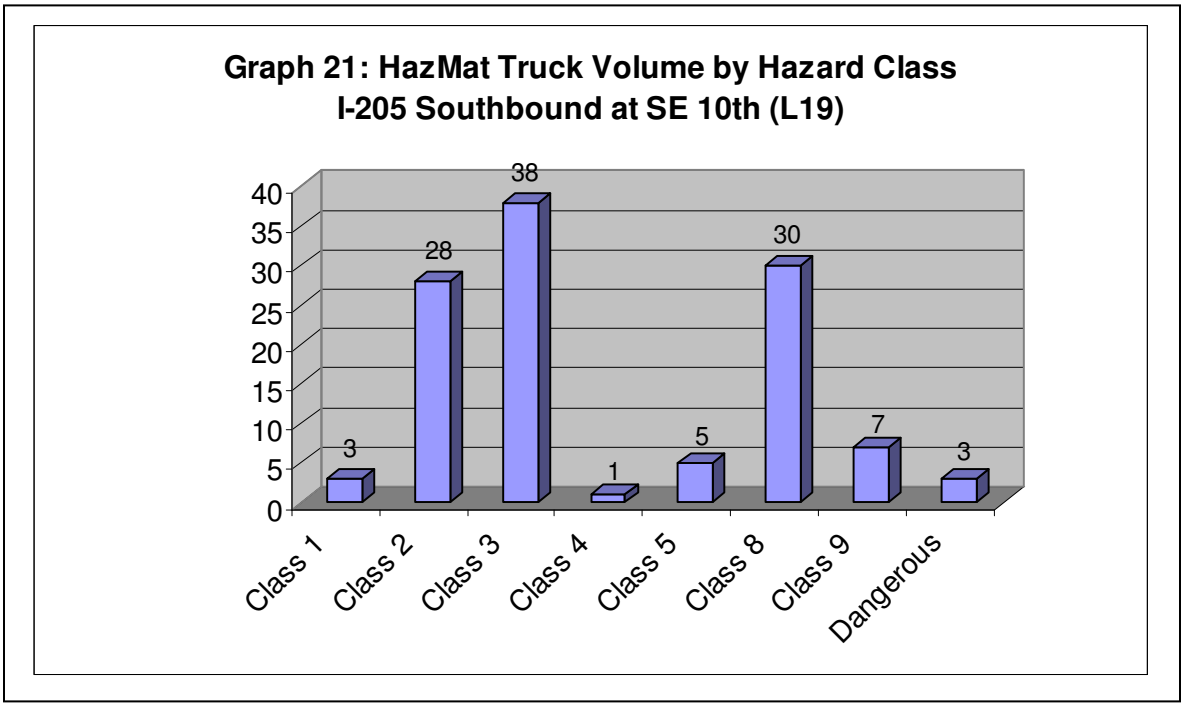
Graph 19:



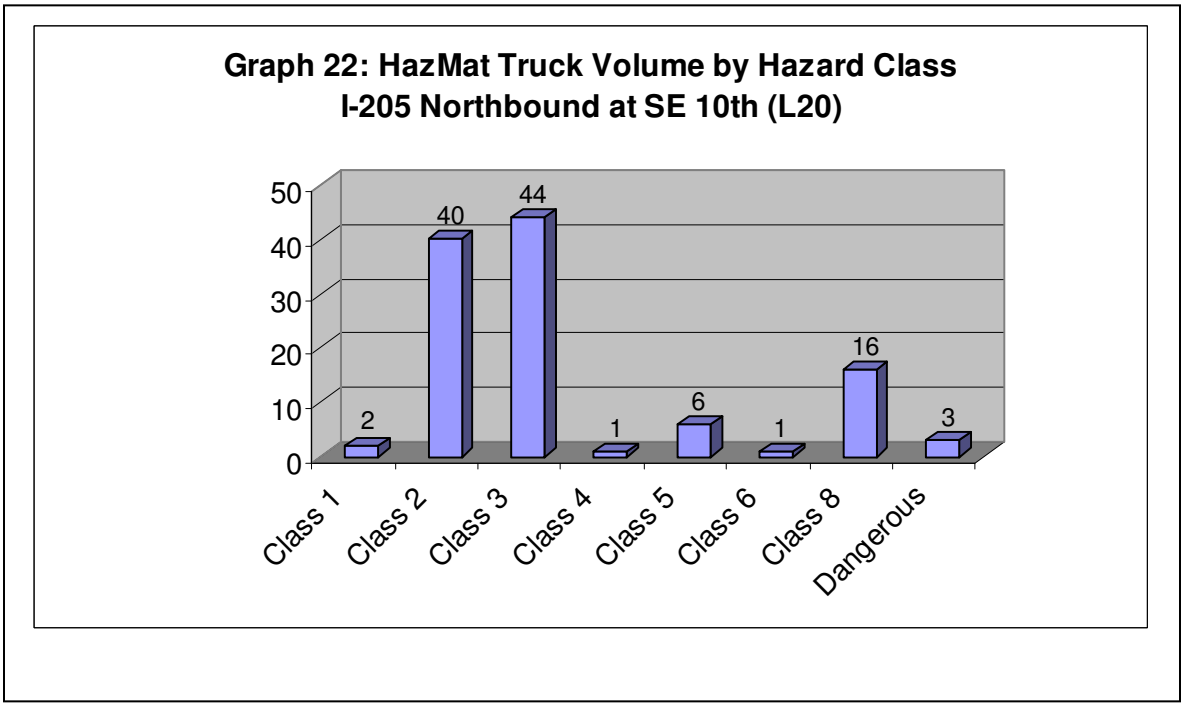
Graph 20:



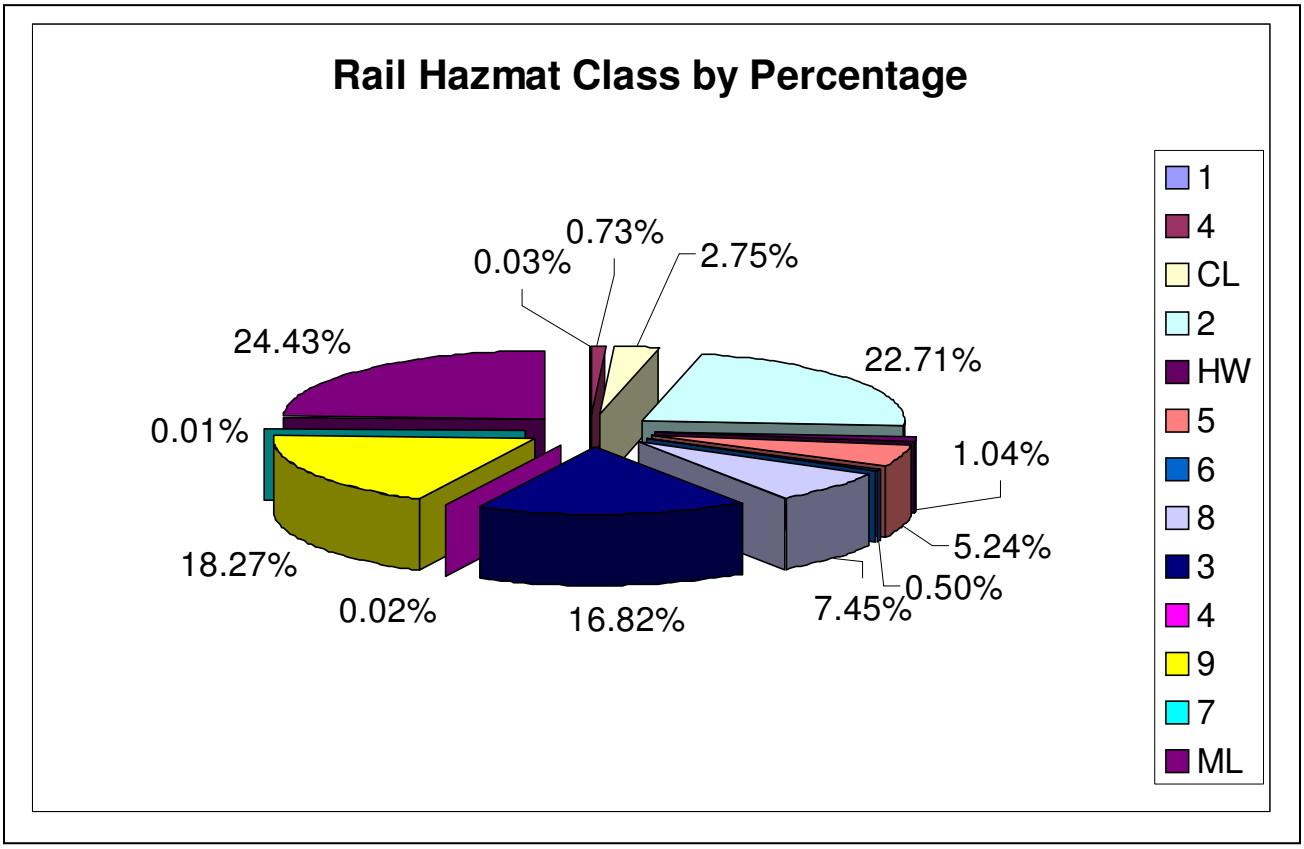
Graph 21:



Graph 22:

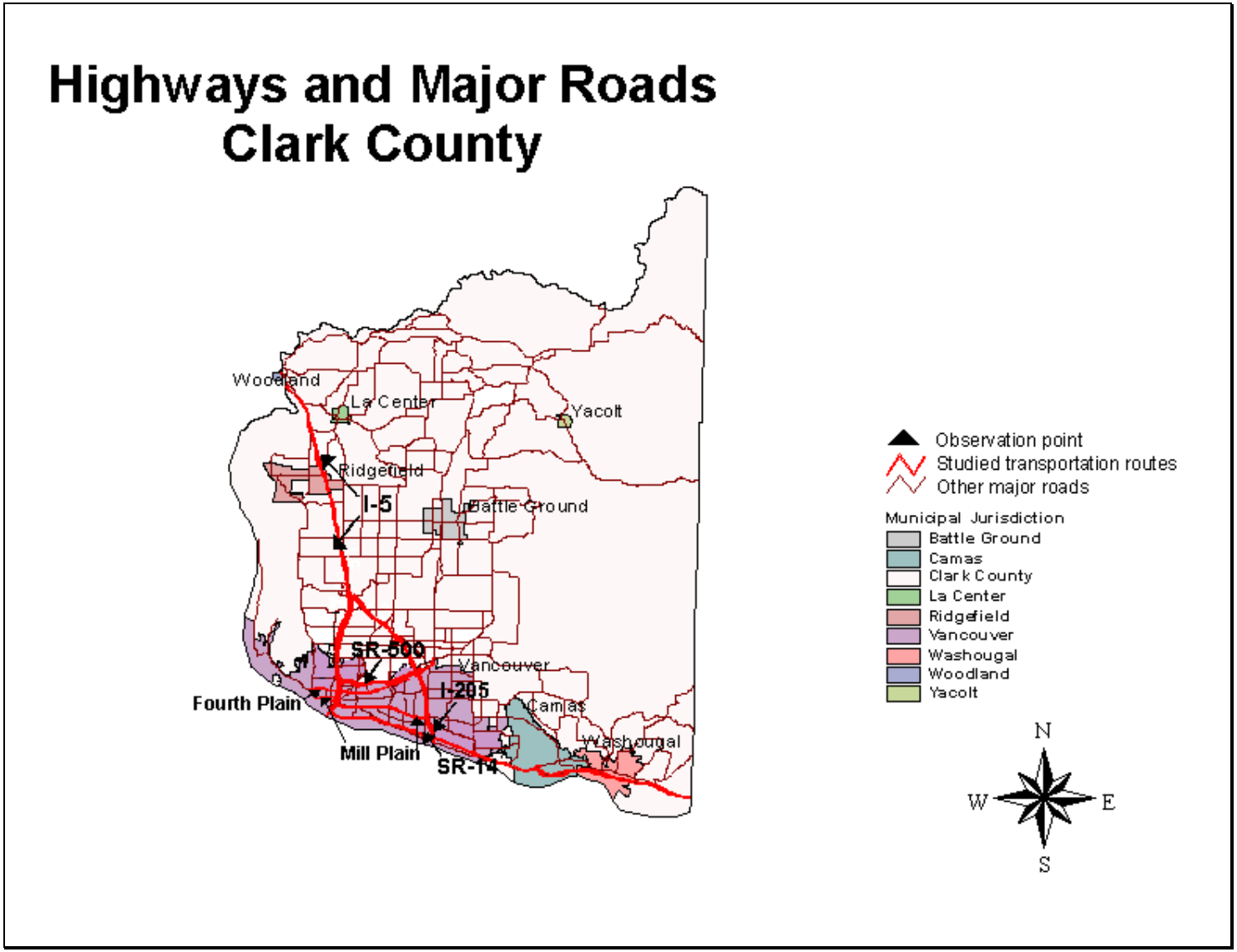


Graph 23: Rail Road Hazardous Materials by Class

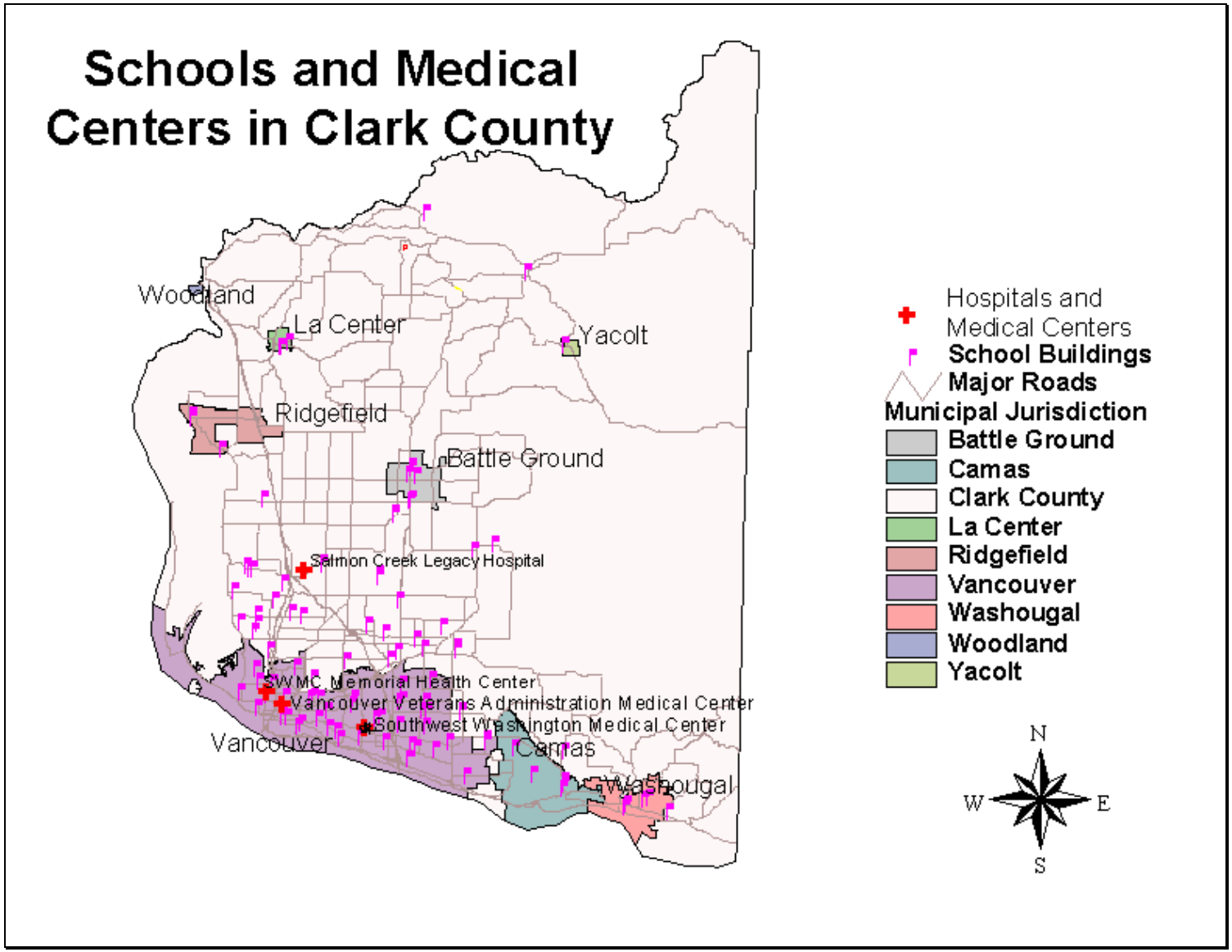


Hazard Class quantities for rail transport by Class

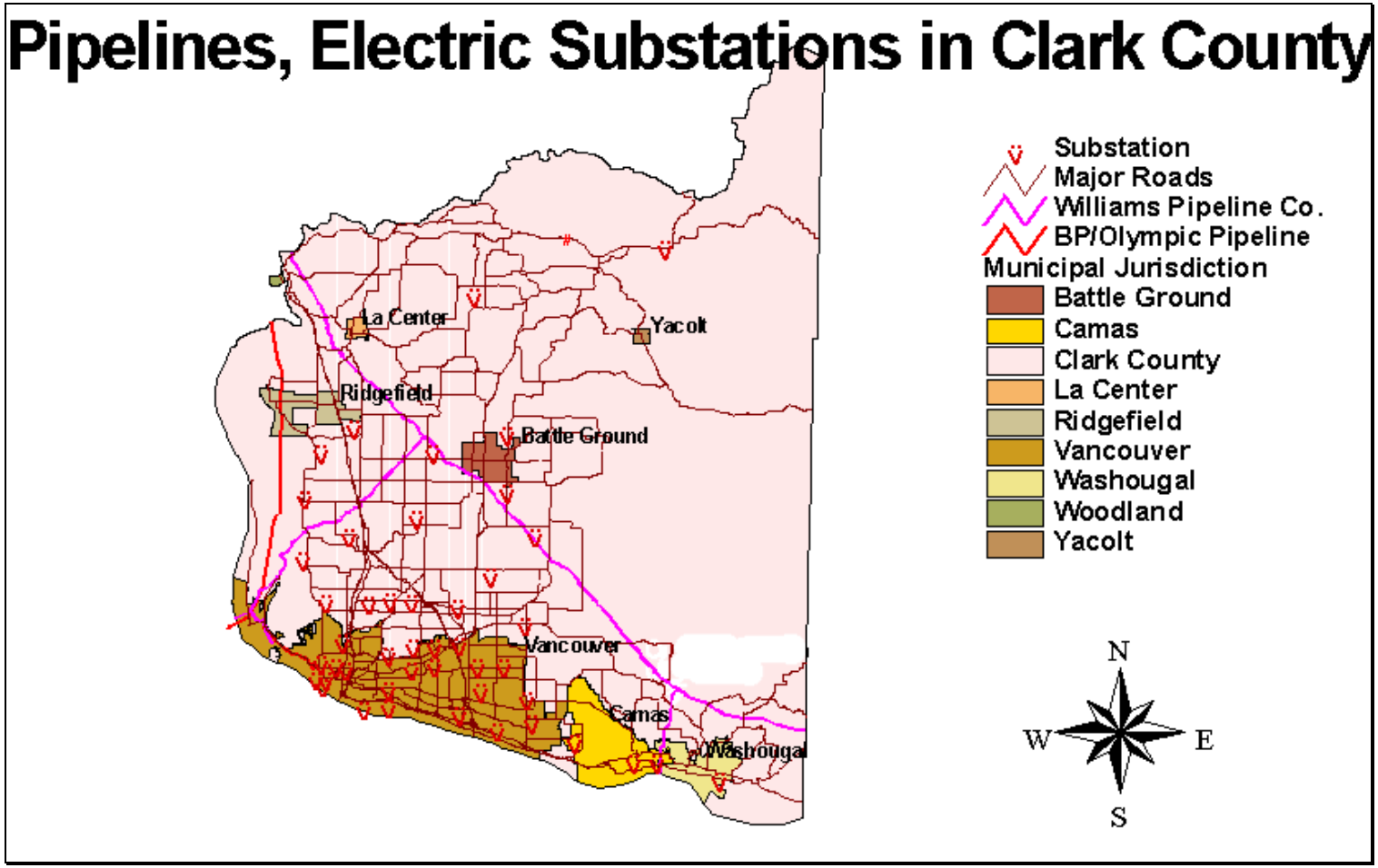
Intermodal Cars		Loaded Cars		Residue Cars	
Class	Quantity	Class	Quantity	Class	Quantity
2.1	2	HW	9	HW	0
3	10	7	15	7	2
6.1	11	4.1	15	4.1	13
CL	17	1.1	21	1.1	21
8	120	ML	227	ML	178
9	138	4.3	496	6.1	325
HW	1377	CL	1407	4.3	479
ML	32287	2.2	2114	2.2	1986
		2.3	2141	CL	2259
		5.1	3840	5.1	3170
		8	4646	2.3	3995
		2.1	11139	8	5208
		3	12966	2.1	9016
		9	14166	3	9537
				9	10144



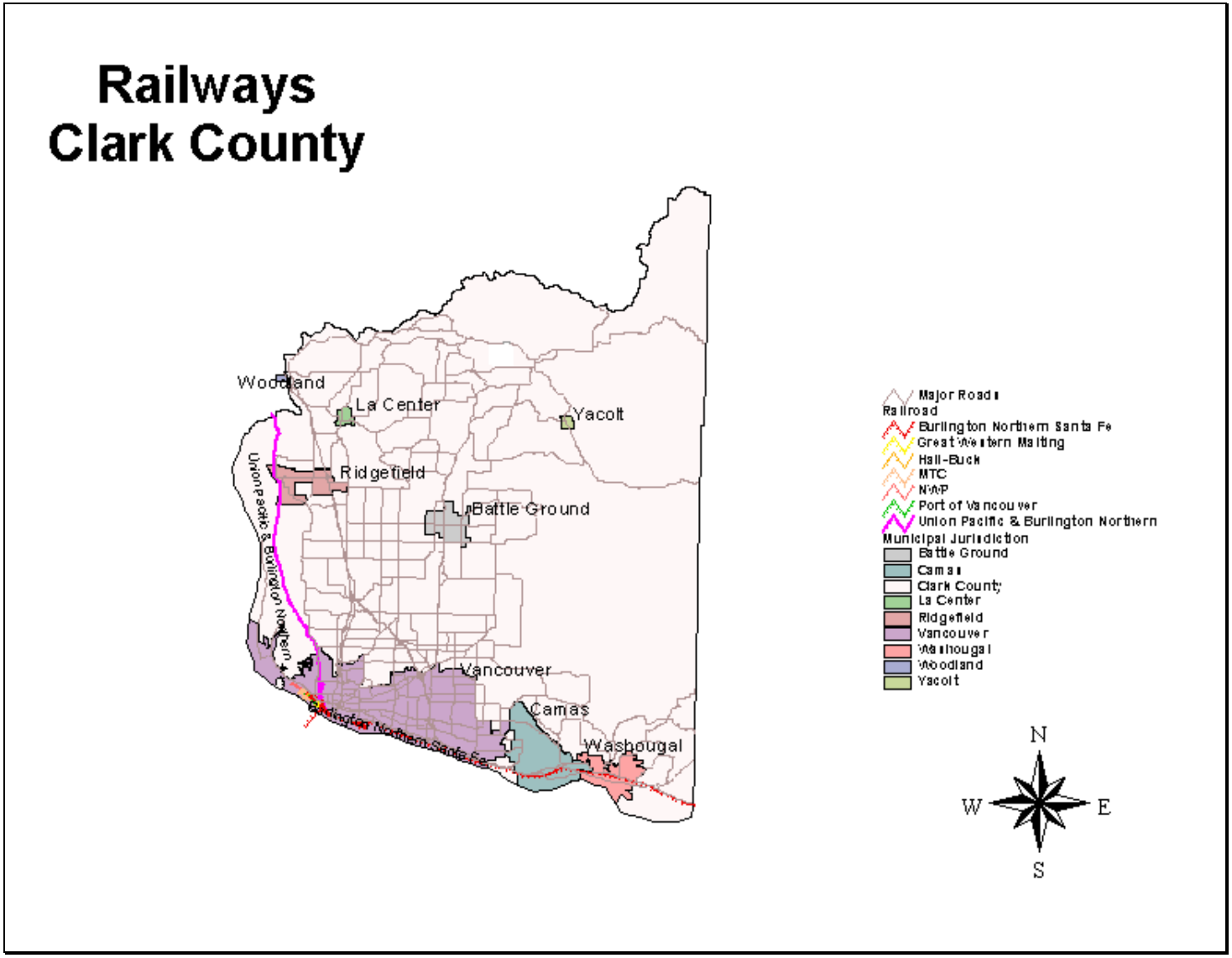
Map 1: This map shows major and minor roads within Clark County. Observation routes are identified.



Map 2: This map shows locations of schools and medical facilities within Clark County.



Map 3: This map showspipelines and electrical infrastructure locations within Clark County.



Map 4: Rail right-of-ways are identified on this map. Major exposures are along the Columbia River, and west of downtown Vancouver at the switching yard.