

# The Navigation Economic Technologies Program

May 1, 2005

NETS

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## COLUMBIA/ SNAKE RIVER TRANSPORTATION STUDY



US Army Corps  
of Engineers®

IWR Report 05-NETS-R-04

# Navigation Economic Technologies

The purpose of the Navigation Economic Technologies (NETS) research program is to develop a standardized and defensible suite of economic tools for navigation improvement evaluation. NETS addresses specific navigation economic evaluation and modeling issues that have been raised inside and outside the Corps and is responsive to our commitment to develop and use peer-reviewed tools, techniques and procedures as expressed in the Civil Works strategic plan. The new tools and techniques developed by the NETS research program are to be based on 1) reviews of economic theory, 2) current practices across the Corps (and elsewhere), 3) data needs and availability, and 4) peer recommendations.

The NETS research program has two focus points: expansion of the body of knowledge about the economics underlying uses of the waterways; and creation of a toolbox of practical planning models, methods and techniques that can be applied to a variety of situations.

## Expanding the Body of Knowledge

NETS will strive to expand the available body of knowledge about core concepts underlying navigation economic models through the development of scientific papers and reports. For example, NETS will explore how the economic benefits of building new navigation projects are affected by market conditions and/or changes in shipper behaviors, particularly decisions to switch to non-water modes of transportation. The results of such studies will help Corps planners determine whether their economic models are based on realistic premises.

## Creating a Planning Toolbox

The NETS research program will develop a series of practical tools and techniques that can be used by Corps navigation planners. The centerpiece of these efforts will be a suite of simulation models. The suite will include models for forecasting international and domestic traffic flows and how they may change with project improvements. It will also include a regional traffic routing model that identifies the annual quantities from each origin and the routes used to satisfy the forecasted demand at each destination. Finally, the suite will include a microscopic event model that generates and routes individual shipments through a system from commodity origin to destination to evaluate non-structural and reliability based measures.

This suite of economic models will enable Corps planners across the country to develop consistent, accurate, useful and comparable analyses regarding the likely impact of changes to navigation infrastructure or systems.

NETS research has been accomplished by a team of academicians, contractors and Corps employees in consultation with other Federal agencies, including the US DOT and USDA; and the Corps Planning Centers of Expertise for Inland and Deep Draft Navigation.

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*The NETS program was overseen by Mr. Robert Pietrowsky, Director of the Institute for Water Resources.*

May 1, 2005



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# COLUMBIA/ SNAKE RIVER TRANSPORTATION STUDY

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Institute for Water Resources  
U.S. Army Corps of Engineers  
Alexandria, Virginia

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# Columbia/Snake River Transportation Study



**Final Report**

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# Columbia/Snake River Transportation Study

## Final Report

Prepared for the

**Navigation Economic Technologies Program  
Institute for Water Resources  
U.S. Army Corps of Engineers  
Alexandria, Virginia**

By

Ken Casavant and Eric Jessup

May 2005

## **Introduction**

This report examines the demand for transportation along the Columbia Snake River system in the Pacific Northwest. The story of the competition between and among modes of transportation is good background for the current competitive situation affecting the demand for waterborne transportation on the river system.

## **Development of the Transportation Systems**

The initial demand from transportation arose because of the demand for commercial grain production in response to the influx of miners into the region during the 1850's. Over the next 125 years the transportation system was expanded onto a complete multimodal system as rail lines were built, roads were paved and improved and a 465-mile waterway was created by a series of locks and dams on the Snake and Columbia Rivers

Multimodal shipments have been part of the eastern Washington grain business since the 1850s. Grain was originally shipped from the Walla Walla region to the coastal regions using a combination of wagons and steamships. Portage railroads were built, at Celilo in 1859 and at Cascades in 1863, to move grain from steamboat to steamboat around the falls at those locations.

In the late 1870's and 1880s, railroads rushed to build lines into the rich Palouse region as they competed to transport the agricultural products from the area. Steamboat traffic on the river ended in 1880; by 1882 Walla Walla was connected to Portland by railroad. Over 1,500 miles of rail line had been constructed in Washington by the end of the 1880s; interestingly, this is a little more than the 1,369 miles of rail lines abandoned in Washington between 1980 and 1991, after the Staggers Rail Act was implemented.

Water transportation on the Snake and Columbia Rivers was reborn when the Bonneville Lock and Dam opened in 1937. By 1975 river traffic increased dramatically as the McNary, The Dalles and John Day dams and locks were opened on the Columbia River and the Ice Harbor, Lower Monumental, Little Goose, and Lower Granite dams and locks were opened on the Snake River. The full 465-mile slack water system from Lewiston, Idaho to the Pacific Ocean became operational in 1975. By 1978, Columbia River ports received 87 percent of the total volume of grain shipped from eastern Washington,

Oregon and Idaho. Truck-barge moved 51 percent of the grain to the ocean ports in 1978, rail shipped 36 percent and 13 percent went to Puget Sound ports.

Trucks originally were used as feeders for the rail system, bringing produce from production areas to the rail station. The miles of hard surfaced roads in Washington grew from 91 in 1910 to 4,200 in 1942. The number of roads grew substantively after World War II as federal aid for highways was increased. Many of the roads serving rural Washington were laid out during the 1920s and 1930s and later paved and hard surfaced during the 1940s and 1950s.

During the 1950s, trucks became an effective long haul competitor to rail carriage of grain as railroads were discouraged from setting competitive rail rates by the Interstate Commerce Commission regulatory process. Rail deregulation legislation passed in 1980 provided railroads the opportunity to price their services competitively and eased the restrictions on abandoning unprofitable lines.

Following rail deregulation in 1980, a rail rate structure was established which offered considerably lower rates for shipments shipped as bulk rail. Additionally, the railroads abandoned over 1,369 miles of branch lines over the next 11 years, leaving some country elevators without rail service. As a result of abandonment, rail shipment of grain became concentrated at elevators which could handle 25 or 26 car units and had the high volume load out equipment to load the rail car unit with 24 hours.

As of the early 1970s and 1980s, trucks were no longer able to compete for the long haul movement of grain. Two competitive modes emerged, survived and greatly influenced the decrease in utilization of trucks. Barge companies use the Snake and Columbia River System extensively since completion in 1975. Railroad companies experienced greater regulatory freedom, which allowed them to adopt new pricing schemes to compete directly with trucks and barges. The original feeder role of trucks was reborn and expanded as trucks moved grain from satellite elevators to multiple-rail car terminals, river terminals and to local buyer such as cattle feeders, dairies, flour mills and breweries.

The grain marketing system has evolved into a traditional pattern. Grain is delivered at harvest time to an elevator within a relatively short distance of the field or to the farmer/s own storage. Farmers wish to minimize the transport time from the field to initial storage so as to have the trucks available to empty the combines in the field and to keep the combines harvesting grain. Once the grain is ready to harvest, each additional day it is unharvested increases the risk the crop could be lost to rain, hail fire or wind.

In the Pacific Northwest, grain warehouse firms commonly operate several elevators located at different locations in their area of service. This pattern of elevator location developed because railroads came to grain producing areas before there were trucks. Grain storage needed to be located in production areas near farm fields at harvest time and on rail lines so that the grain could be moved to market.

The number of grain storage houses decreases as operations were consolidated and trucks made it possible to move grain longer distances from farm to final destination. The shift away from “flat-houses”, which were designed to handle bagged grains, to bulk grain elevators did not occur in eastern Washington until the 1930s and early 1940s when many of the existing basic elevator units were built by farmer owned cooperatives. With the exception of river terminals built after the completion of the Snake and Columbia River lock and dam system, only a few elevators were built in the 16 county area of eastern Washington. A 1983 study by Dooley and Casavant reported that the average age of grain elevators in eastern Washington was 33 1/3 years, with a life expectancy of 45 to 50 years.

Even though the shift from “flat-houses” to elevators brought further consolidation, the general distribution pattern of elevators located on rail lines was maintained throughout the grain production areas. Since the 1970's, many of the rail lines serving these country elevators have been abandoned. Elevators without rail or river service have in effect become satellite elevators for elevators with multiple-car rail service or for elevators located on the river system. Grain is moved from these satellites to other rail or river terminals by truck when needed or as dictated by weather and market conditions. Recent changes have seen some rail-barge movement from eastern Washington.

The complete (meaning access to truck, barge and rail) transportation system found in the area has allowed producers to develop links with distant customers as the region expands its wheat, barley and other grain markets globally. The economic forces created by the competition between rail, truck and barge have provided one of the most competitive transportation rate structures of any grain producing region in the U.S., an important factor as global markets become increasingly competitive.

### **Study Focus**

The critical element in the above evolution of the transportation system in the region is the availability of slack water navigation into Idaho. It has been determined by Casavant that as late as 2000, grain was being moved by rail on the equivalent of 1946 rail rates. This did not occur because of the benevolence of the railroads in the region; rather it occurred because of the availability of competitive barge rates.



This waterborne navigation was made available through the work of the Army Corps of Engineers (ACE) who has the mandate of managing the nation's waterways. These waterways have alternative uses, power generation, fish protection/sustainability, environmental support, navigation, recreation, etc. The delicate balance among these goals puts pressure on the ACE to understand the benefits and costs of alternative improvements or maintenance of the navigation use.

Understanding the demand for the navigation services is a critical component of determining those benefits, and ACE undertakes studies to determine those benefits, and associated costs, of maintaining the navigation capabilities of the river system. Survey work, in numerous studies, is used to provide information that allows theoretically justified models of demand to be estimated and used in the ACE's planning and implementation responsibilities. ACE seeks to determine the competitive structure underlying the demand for lock services in this study. Understanding the complexities, elasticities and capacities of alternative modes is the underlying need for the evaluations.

ACE relies on three or four primary models to assess the benefits and costs, models that are very sensitive to the structure of the demand curve: The Tow Cost Model (TCM), the Essence Model (EM), the Ohio River Navigation Investment Model (ORNIM), among others. Construction and estimation of the demand curve for river transportation requires in depth understanding of the shipper decision framework as well as the structure of the industry and the modes in the area. Specific knowledge about shipper response to changes in transportation costs and times is desired to rigorously estimate the shape of the demand curve.

### **Study Assignment**

The authors of this report were retained to design and implement a survey of shippers, both grain and non grain, on the Columbia-Snake River waterway. The research was to provide a descriptive review of demand and potential demand for Columbia-Snake waterway services and to develop a database to be used econometrically to examine demand decisions.

Specific work tasks were:

1. Work with the Institute for Water Resources to develop a survey instrument (and/or modify an existing survey instrument) that has the capacity to provide estimates of poll level demands and allow specific criticisms of previous models used by the ACE to be assessed;

2. Develop a contact list of existing and potential shippers for use in a survey;
3. Develop a survey methodology;
4. Coordinate the survey and survey design with a survey agency;
5. Oversee the implementation of the survey;
6. Organize and clean the data;
7. Write a descriptive report that summarizes the major issues of demand and provides a review of the survey.

Deliverables of the contract were to be the survey instrument, the survey design methodology, the contact list, the survey data and a final descriptive report. This report comprises the final deliverable.

### **Survey Design**

The Social and Economic Sciences Research Center (SESRC) at Washington State University was retained by the authors to conduct the survey of the grain and non grain shippers on the waterway. The SESRC has a national reputation in conducting surveys of this type, via telephone, questionnaire, etc. and has done hundreds of such surveys.

The population in this survey consisted of two parts. The first part was composed of grain elevator businesses in the state of Washington, licensed with the State of Washington Department of Agriculture and listed in its Public Grain Warehouses and grain Dealers Publication. These 78 businesses totaled 414 individual warehouses and differing locations. The second part of the population consisted of 89 non grain businesses located at the ten different ports located on the Snake and Columbia Rivers. The inclusive list was obtained from the individual port tenant lists via telephone and email contact.

The questionnaire itself was modified by the Institute of Water Resources and the SESRC from questionnaires that had been used over the years in over seven surveys by the authors. Up to five versions of the questionnaire were reviewed and modified so as to achieve the purpose of the demand estimation. The final questionnaire was eight pages in length and contained 19 questions and 84

variables. The questionnaire was slightly modified from the grain shipper version to accommodate minor wording changes (the word “elevator” was changed to the word, “business”) for the non grain shipper.

Each grain questionnaire, when printed, was personalized with the warehouse location and state warehouse number and the port questionnaires were personalized with the business name printed on the questionnaire. Each questionnaire was further tailored and personalized at the question level for a response variable reflecting the percentage change necessary to cause a change in the respondent’s shipping methods. A random number between 10% and 60% (with 10% incremental steps) was assigned to each questionnaire to test if that percentage increase in transportation cost or transit time or that percentage decrease in reliability would lead to a change in shipping methods.

### **Survey Implementation**

SESRC submitted the project design and questionnaire to the Institutional Review Board at Washington State University (WSU-IRB) for review of human subjects procedures and compliance with federal regulations for human subject research. Approval was received on September 9, 2004.

### **Pretest**

SESRC and the authors conducted an in-house pretest prior to mailing the questionnaire. The questionnaire was also reviewed by a grain elevator owner for clarity and accuracy. The pretest was conducted to ensure that the questionnaire was understandable for the respondents and to answer several questions to make sure the survey would progress smoothly. After reviewing the pretest comments, the questionnaire was finalized and prepared for the mailings.

## **Data Collection**

The key element of this TDM (Total Design Method) survey procedure was to implement carefully designed and timed mailings to the survey sample respondents. The goal of data collection was to have a completed questionnaire for each individual elevator warehouse owned by a business. All questionnaires mailed included a respondent ID number to track whether it had been completed and returned. The letters were personalized with the business’ name, contact name (when available) and address and printed on SESRC letterhead. All letters were hand signed with a blue ball-point pen by both the SESRC study director and one of the authors.

The first contact sent to grain elevators was mailed on October 19, 2004. It included a cover letter with an 8-page questionnaire booklet for each warehouse and a business reply return envelope. The cover letter introduced the survey and asked to respondents to complete the questionnaire sent for each warehouse. This mailing was sent by USPS Priority mail. Elevator businesses with more than one warehouse had all the questionnaires for the individual warehouses packaged together into a single priority envelope. For the four largest elevator companies, a priority mailing box (available at the post office) was used to send the questionnaires. The business reply envelope was a 9" x 12" or 10" x 13" envelope to accommodate the number of questionnaires to be returned.

The first mailing to Port businesses was sent on November 5, 2004. It was also sent by Priority mail and included a cover letter, 8-page questionnaire booklet and business reply return envelope.

The second contact was a postcard follow-up sent one week after the initial mailing. It was sent October 27, 2004 to Grain businesses and November 12, to Port businesses. The postcard reminder first thanked the respondents for their help with the study and asked them to complete the questionnaire as soon as possible if they had not already done so.

A second questionnaire, cover letter and return envelope was sent to all Grain business non-responders on November 12, 2004 and to Port business non-responders on November 30, 2004. This reminder was sent Priority mail from SESRC and again asked the respondent to complete the paper questionnaire.

The authors also called non-responders from the grain elevator sample to encourage them to return the questionnaires since they had worked with most of the respondents at one time and had personal rapport with them.

### **Data Entry and Data Management**

Data entry of the paper questionnaires began on December 9, 2004 and ended on January 26, 2005. Data entry consists of three steps: (1) coding, (2) initial input and (3) verification. In addition, there is a final data validation step that occurs after all questionnaires have been data entered. These procedures are described below.

The first step of data entry is the process of coding each questionnaire. Coding consists of trained SESRC staff reviewing each questionnaire to make sure each answer is eligible and conforms to a set of

specifications. These specifications are outlined in a coding manual, which can be found at the end of this report. Once coded, questionnaires are ready for computer entry.

For computer-assisted data entry work, the SESRC relies on a computer-assisted telephone interviewing (CATI) software installed on networked computer workstations. This CATI system is produced and maintained by the Voxco company. This CATI system creates survey databases that are readable not only by its own statistics program, STATXP, but also by SAS, Lotus, SPSS, Excel, Access, and most other microcomputer and mainframe software.

The second data entry step occurs during initial entry of data and is handled by the CATI system. The system prompts interviewers for valid responses to every question in the survey. For example, on numeric questions, when a response is entered into the computer the CATI system can determine the validity of a response by limiting the acceptable numeric values. When an invalid response is entered, the computer warns the interviewer that the value is out of range and prompts the interviewer for a valid response. Initial entry of data simply means an interviewer enters the answers the respondent wrote on the questionnaire.

The third data entry step is verification of initial entry. Verification is when a different interviewer enters the same questionnaire and its responses a second time into the CATI system. The CATI system then compares the entries, and informs the interviewer if a different response has been entered. If there is a discrepancy between the two entries, the CATI program then prompts the interviewer to make a correction to either the initial entry, or to the verification entry. The SESRC performs verification on every questionnaire received, and on every question within the questionnaire (100% verification). These steps comprise data entry at the SESRC.

A final data validation step occurs at the data management level and consists primarily of accounting for all cases in the project, ensuring that a data record exists for every completed questionnaire received, and reviewing individual cases for discrepancies between initial input and verification. All discrepancies were checked against the questionnaire to ensure accuracy in the data. Data records are passed through a SAS program to ensure that all data fields are readable, and that all responses are read in the format specified for that variable.

## **Response Rate**

Table 1 displays the response rate achieved for the grain businesses, the individual warehouses, and the port businesses. The first response rate is the ratio of number of completed questionnaires to the total number in the sample. This questionnaire was mailed to 78 grain elevator companies (representing 414 individual elevator warehouses) in the state of Washington and 89 businesses headquartered in the Ports along the two rivers. For the grain elevator companies as individuals, 49 completed and returned their questionnaires for a completion rate of 70%. For the individual elevators, 181 questionnaires were completed and returned for a completion rate of 52%. For the Port Shippers, 31 questionnaires were completed and returned for a completion rate of 51%.

**Table 1. Final Sample Disposition Report**

	Grain businesses	Warehouses	Port businesses
Completed Questionnaires	49	181	31
Refusals	2	55	0
Ineligible	7	23	21
Return to Sender	1	0	7
Other	0	45	0
Non-Response	19	110	30
Total	78	414	89
Response Rate (Completes/Sample Size)	62.8%	43.7%	34.8%
Completion Rate (Completes/Completes + Refusals + No Response)	70%	52.3%	50.8%

## **Research Findings**

For consistency purposes the descriptive findings of the survey are presented below following the question sequence of the survey questionnaire. The questionnaire was broken down into six sections and these provide the outline of the following brief discussion.

## Shipping Characteristics

It was desired to determine what each firm or facility specialized in or moved the most of. Survey respondents by primary commodity shipped from the elevator/business are indicated in Table 2. Responding to the numbers on the grain and non-grain survey lists 86% of the respondents shipped grain, which includes wheat, barley, dry beans, lentils and garbanzo beans. There are 27 non grain firms who moved many varied products, including reinforcing steel, propane, fertilizers, chemicals, fuel and differing wood products. Wood products and construction materials are 50% of the non grain shipments and 7% of the total firms. The varied movements on the river reflect the overall attractiveness of waterborne transportation, especially for bulk or containerized products.

Shipment size affects the ability to shift among modes and identifies to a general degree the actual mode used. Table 3 reveals a large range in shipment size and is in the varying units from the differing facilities. It includes gallons, tons, hundredweight, bushels and several other units of shipment, as indicated in Table 4. Most of the responses were in bushels, reflecting the survey lists but tons and hundredweight were also common. In Table 5 we converted the different units into a common estimate of tons, which we later use to compare rates and other operating characteristics. The many differing responses seem to show that the respondents looked specifically at their last bill of lading to get a precise number for the size of last shipment. Noticeable is the large groupings around the average shipment size for truck, rail and barge (probably in a tow) in Table 5, 30-35 tons, 3,000 tons and 60,000 tons, respectively.

Question three of the questionnaire sought to investigate the loading and unloading capabilities at each location. Tables 6-11 provide detailed responses. Between 97% and 98% of the facilities have the ability to load and unload trucks. Only 12% can load barges and even less, 4% can unload barges. Those capable of unloading barges were all of the non-grain facilities and reflected the fertilizer, chemicals and empty container movements. Interestingly, only 43% of the facilities were capable of loading rail while slightly over 20% had the ability to unload rail cars at that location. These responses indicate the orientation of these facilities is to ship out, rather than to ship in, which makes economic sense given the production of bulk products in the region and the low consumer density.

Respondents were also asked to identify, if they did not have barge or rail loading capability, how far it was to the nearest facility that provided that service. Tables 12-16 provide the array of responses and the statistical characteristics of those responses. It is apparent that some facilities are very close, if not on, the nearest facility that has barge loading capabilities, with 13 respondents indicating that they were

**Table 2:** The primary commodity shipped from this elevator

Q1	Frequency	Percent	Cumulative Frequency	Cumulative Percent
CONSTRUCTION MATERIALS	7	3.30	7	3.30
FERTILIZER	2	0.94	9	4.25
FRESH FRUIT	1	0.47	10	4.72
FUEL	2	0.94	12	5.66
GRAINS	183	86.32	195	91.98
HEAVY EQUIPMENT	1	0.47	196	92.45
HOUSEHOLD PRODUCTS	1	0.47	197	92.92
MANUFACTURED FOOD	4	1.89	201	94.81
MANUFACTURED MATERIALS	3	1.42	204	96.23
WOOD PRODUCTS	8	3.77	212	100.00

**Table 3:** How large was your last single outbound shipment

O2_1	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Skiped	4	.	.	0.48
1	1	0.48	1	0.96
8	1	0.48	2	1.44
20	1	0.48	3	1.92
24	1	0.48	4	2.40
25	1	0.48	5	2.88
26	1	0.48	6	3.37
28	1	0.48	7	4.33
29	2	0.96	9	5.77
30	3	1.44	12	7.21
32	3	1.44	15	7.69
33	1	0.48	16	8.65
35	2	0.96	18	9.62
36	2	0.96	20	10.10
40	1	0.48	21	10.58
80	1	0.48	22	11.06
100	1	0.48	23	11.54
160	1	0.48	24	12.02
247.26	1	0.48	25	12.50
250	1	0.48	26	14.42
440	4	1.92	30	14.90
470	1	0.48	31	15.87
480	2	0.96	33	16.35
490	1	0.48	34	17.31
700	2	0.96	36	17.79
900	1	0.48	37	25.96
1000	17	8.17	54	37.02
1100	23	11.06	77	41.83
1125	10	4.81	87	43.75
1150	4	1.92	91	44.23
1160	1	0.48	92	56.25
1200	25	12.02	117	57.21
1400	2	0.96	119	57.69
1500	1	0.48	120	58.17
2900	1	0.48	121	58.65
3000	1	0.48	122	60.10
3300	3	1.44	125	

**Table 3 (continued):** How large was your last single outbound shipment

O2_1	Frequency	Percent	Cumulative Frequency	Cumulative Percent
3400	1	0.48	126	60.58
3600	3	1.44	129	62.02
3665	1	0.48	130	62.98
3800	1	0.48	131	63.94
4000	2	0.96	133	64.42
8000	1	0.48	134	65.38
10000	2	0.96	136	65.87
10200	1	0.48	137	66.35
11000	1	0.48	138	66.83
12320	1	0.48	139	67.31
14000	1	0.48	140	67.79
15000	1	0.48	141	68.27
17000	1	0.48	142	69.71
20000	3	1.44	145	70.19
20500	1	0.48	146	70.67
33000	1	0.48	147	71.15
40000	1	0.48	148	71.63
42000	1	0.48	149	72.60
44000	2	0.96	151	73.08
48000	1	0.48	152	



50000	2	0.96	154	74.04
55000	1	0.48	155	74.52
60000	2	0.96	157	75.48
60500	1	0.48	158	75.96
63000	1	0.48	159	76.44
64000	1	0.48	160	76.92
71600	1	0.48	161	77.40
72340	1	0.48	162	77.88
80000	1	0.48	163	78.37
82500	1	0.48	164	78.85
87100	1	0.48	165	79.33
88000	2	0.96	167	80.29
90000	15	7.21	182	87.50
100000	2	0.96	184	88.46
105000	1	0.48	185	88.94
120000	10	4.81	195	93.75
140000	1	0.48	196	94.23
154322	2	0.96	198	95.19
180000	1	0.48	199	95.67
190000	1	0.48	200	96.15
198000	4	1.92	204	98.08
210000	1	0.48	205	98.56
480000	2	0.96	207	99.52
1680000	1	0.48	208	100.00

**Table 4:** Type of unit for last single outbound shipment

	Q2A	Frequency	Percent	Cumul ative Frequency	Cumul ative Percent
Missi ng		3			
Tons		34	16.27	34	16.27
Bushel s		129	61.72	163	77.99
Cwt.		13	6.22	176	84.21
Gal lons		1	0.48	177	84.69
Other		32	15.31	209	100.00

**Table 5:** Tons of Last Shipment

Q2_A	Frequency	Percent	Cumul ative Frequency	Cumul ative Percent
.	4			
0.0005	1	0.48	1	0.48
0.02	1	0.48	2	0.96
0.35	1	0.48	3	1.44
1.5	1	0.48	4	1.92
5	2	0.96	6	2.88
5.5	1	0.48	7	3.37
8	2	0.96	9	4.33
10	2	0.96	11	5.29
20	2	0.96	13	6.25
21	1	0.48	14	6.73
22	6	2.88	20	9.62
23.5	1	0.48	21	10.10
24	5	2.40	26	12.50
24.5	1	0.48	27	12.98
25	2	0.96	29	13.94
26	1	0.48	30	14.42
27.5	1	0.48	31	14.90
28	1	0.48	32	15.38
29	2	0.96	34	16.35
30	20	9.62	54	25.96
31.5	1	0.48	55	26.44
32	4	1.92	59	28.37
33	24	11.54	83	39.90
33.6	2	0.96	85	40.87
33.75	10	4.81	95	45.67
34.5	4	1.92	99	47.60
34.8	1	0.48	100	48.08
35	3	1.44	103	49.52
35.8	1	0.48	104	50.00
36	27	12.98	131	62.98
36.17	1	0.48	132	63.46
45	1	0.48	133	63.94
52.5	1	0.48	134	64.42
77.161	2	0.96	136	65.38
80	1	0.48	137	65.87
90	1	0.48	138	66.35
95	1	0.48	139	66.83
96	1	0.48	140	67.31
99	7	3.37	147	70.67
100	1	0.48	148	71.15
102	1	0.48	149	71.63
105	1	0.48	150	72.12

120	1	0.48	151	72.60
240	3	1.44	154	74.04
247.26	1	0.48	155	74.52
250	1	0.48	156	75.00
306	1	0.48	157	75.48
450	1	0.48	158	75.96
510	1	0.48	159	76.44
600	1	0.48	160	76.92
615	1	0.48	161	77.40
700	1	0.48	162	77.88
990	1	0.48	163	78.

**Table 5 (continued):** Tons of Last Shipment

Q2_A	Frequency	Percent	Cumulative Frequency	Cumulative Percent
1500	2	0.96	165	79.33
2400	1	0.48	166	79.81
2475	1	0.48	167	80.29
2520	1	0.48	168	80.77
2613	1	0.48	169	81.25
2640	2	0.96	171	82.21
2700	14	6.73	185	88.94
2900	1	0.48	186	89.42
3000	3	1.44	189	90.87
3600	13	6.25	202	97.12
3665	1	0.48	203	97.60
3800	1	0.48	204	98.08
4200	1	0.48	205	98.56
6300	1	0.48	206	99.04
12320	1	0.48	207	99.52
60500	1	0.48	208	100.00

**Table 6:** Loading capabilities: Truck

Q3A_L	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Missing	1			
Yes	205	97.16	205	97.16
No	6	2.84	211	100.00

**Table 7:** Unloading capabilities: Truck

Q3A_U	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Yes	209	98.58	209	98.58
No	3	1.42	212	100.00

**Table 8:** Loading capabilities: Barges

Q3B_L	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Missing	1			
Yes	25	11.85	25	11.85
No	186	88.15	211	100.00

**Table 9:** Unloading capabilities: Barges

Q3B_U	Frequency	Percent	Cumul ative Frequency	Cumul ative Percent
Yes	9	4.25	9	4.25
No	203	95.75	212	100.00

**Table 10:** Loading capabilities: Rail Cars

Q3C_L	Frequency	Percent	Cumul ative Frequency	Cumul ative Percent
Missi ng	1	.	.	.
Yes	91	43.13	91	43.13
No	120	56.87	211	100.00

**Table 11:** Unloading capabilities: Rail Cars

Q3C_U	Frequency	Percent	Cumul ative Frequency	Cumul ative Percent
Yes	44	20.75	44	20.75
No	168	79.25	212	100.00

**Table 12:** How close is the nearest barge loading facility

Q3B	Frequency	Percent	Cumul ative Frequency	Cumul ative Percent
Don' t Know	3	.	.	.
Missi ng	3	.	.	.
Ski pped	25	.	.	.
1	13	7.18	13	7.18
2	2	1.10	15	8.29
3	1	0.55	16	8.84
4	1	0.55	17	9.39
5	1	0.55	18	9.94
6	1	0.55	19	10.50
8	1	0.55	20	11.05
10	1	0.55	21	11.60
11	1	0.55	22	12.15
12	1	0.55	23	12.71
13	1	0.55	24	13.26
15	3	1.66	27	14.92
16	1	0.55	28	15.47
18	1	0.55	29	16.02
19	1	0.55	30	16.57
20	1	0.55	31	17.13
21	3	1.66	34	18.78
22	2	1.10	36	19.89
24	1	0.55	37	20.44
25	6	3.31	43	23.76

**Table 12 (conti nued):** How close is the nearest barge loading facility

Q3B	Frequency	Percent	Cumul ative Frequency	Cumul ative Percent
26	1	0.55	44	24.31
28	3	1.66	47	25.97
29	1	0.55	48	26.52
30	3	1.66	51	28.18
31	3	1.66	54	29.83
32	1	0.55	55	30.39
33	1	0.55	56	30.94
34	3	1.66	59	32.60
35	1	0.55	60	33.15
36	4	2.21	64	35.36
37	1	0.55	65	35.91
39	2	1.10	67	37.02
40	5	2.76	72	39.78
41	3	1.66	75	41.44
42	1	0.55	76	41.99
45	7	3.87	83	45.86
50	13	7.18	96	53.04
52	1	0.55	97	53.59
54	2	1.10	99	54.70

55	3	1.66	102	56.35
57	1	0.55	103	56.91
58	1	0.55	104	57.46
60	3	1.66	107	59.12
63	1	0.55	108	59.67
65	1	0.55	109	60.22
69	2	1.10	111	61.33
70	3	1.66	114	62.98
72	1	0.55	115	63.54
75	3	1.66	118	65.19
78	1	0.55	119	65.75
80	1	0.55	120	66.30
82	1	0.55	121	66.85
84	1	0.55	122	67.40
90	1	0.55	123	67.96
92	3	1.66	126	69.61
96	1	0.55	127	70.17
100	12	6.63	139	76.80
101	1	0.55	140	77.35
107	1	0.55	141	77.90
109	1	0.55	142	78.45
110	4	2.21	146	80.66
114	2	1.10	148	81.77
115	1	0.55	149	82.32
116	1	0.55	150	82.87
118	1	0.55	151	83.43
120	7	3.87	158	87.29
121	1	0.55	159	87.85
125	1	0.55	160	88.40
126	1	0.55	161	88.95
130	2	1.10	163	90.06
137	1	0.55	164	90.61
140	3	1.66	167	92.27
142	1	0.55	168	92.82
145	2	1.10	170	93.92
147	1	0.55	171	94.48

**Table 12 (continued):** How close is the nearest barge loading facility

Q3B	Frequency	Percent	Cumulative Frequency	Cumulative Percent
150	1	0.55	172	95.03
151	1	0.55	173	95.58
161	2	1.10	175	96.69
166	2	1.10	177	97.79
178	1	0.55	178	98.34
200	2	1.10	180	99.45
250	1	0.55	181	100.00

**Table 13:** Variable: Q3B (How close is the nearest barge loading facility)

Moments			
N	181	Sum Weights	181
Mean	64.6685083	Sum Observations	11705
Std Deviation	49.1765589	Variance	2418.33395
Skewness	0.8376725	Kurtosis	0.34781047
Uncorrected SS	1192245	Corrected SS	435300.11
Coeff Variation	76.0440595	Std Error Mean	3.65526484

**Table 14:** Basic Statistical Measures

Location		Variability	
Mean	64.66851	Std Deviation	49.17656
Median	50.00000	Variance	2418
Mode	1.00000	Range	249.00000
		Interquartile Range	72.00000

**Table 15:** Quantiles (Definition 5)

Quantile	Estimate
100% Max	250
99%	200
95%	150
90%	130
75% Q3	100
50% Median	50
25% Q1	28
10%	6

5% 1  
1% 1  
0% Min 1

**Table 16:** Variable: Q3B (How close is the nearest barge loading facility)

Missing Values			
Missing Value	Count	Percent of All Obs	Percent of Missing Obs
.	25	11.79	80.65
D	3	1.42	9.68
M	3	1.42	9.68
Total	31	14.62	100.00

**Table 17:** Frequency Counts

Percents				Percents				Percents			
Value	Count	Cell	Cum	Value	Count	Cell	Cum	Value	Count	Cell	Cum
1	13	7.2	7.2	35	1	0.6	33.1	96	1	0.6	70.2
2	2	1.1	8.3	36	4	2.2	35.4	100	12	6.6	76.8
3	1	0.6	8.8	37	1	0.6	35.9	101	1	0.6	77.3
4	1	0.6	9.4	39	2	1.1	37.0	107	1	0.6	77.9
5	1	0.6	9.9	40	5	2.8	39.8	109	1	0.6	78.5
6	1	0.6	10.5	41	3	1.7	41.4	110	4	2.2	80.7
8	1	0.6	11.0	42	1	0.6	42.0	114	2	1.1	81.8
10	1	0.6	11.6	45	7	3.9	45.9	115	1	0.6	82.3
11	1	0.6	12.2	50	13	7.2	53.0	116	1	0.6	82.9
12	1	0.6	12.7	52	1	0.6	53.6	118	1	0.6	83.4
13	1	0.6	13.3	54	2	1.1	54.7	120	7	3.9	87.3
15	3	1.7	14.9	55	3	1.7	56.4	121	1	0.6	87.8
16	1	0.6	15.5	57	1	0.6	56.9	125	1	0.6	88.4
18	1	0.6	16.0	58	1	0.6	57.5	126	1	0.6	89.0
19	1	0.6	16.6	60	3	1.7	59.1	130	2	1.1	90.1
20	1	0.6	17.1	63	1	0.6	59.7	137	1	0.6	90.6
21	3	1.7	18.8	65	1	0.6	60.2	140	3	1.7	92.3
22	2	1.1	19.9	69	2	1.1	61.3	142	1	0.6	92.8
24	1	0.6	20.4	70	3	1.7	63.0	145	2	1.1	93.9
25	6	3.3	23.8	72	1	0.6	63.5	147	1	0.6	94.5
26	1	0.6	24.3	75	3	1.7	65.2	150	1	0.6	95.0
28	3	1.7	26.0	78	1	0.6	65.7	151	1	0.6	95.6
29	1	0.6	26.5	80	1	0.6	66.3	161	2	1.1	96.7
30	3	1.7	28.2	82	1	0.6	66.9	166	2	1.1	97.8
31	3	1.7	29.8	84	1	0.6	67.4	178	1	0.6	98.3
32	1	0.6	30.4	90	1	0.6	68.0	200	2	1.1	99.4
33	1	0.6	30.9	92	3	1.7	69.6	250	1	0.6	100.0
34	3	1.7	32.6								

only one mile away. The most common responses were 50 and 100 miles, combined to be about 14% of the total. The responses over 150 miles appear to be based on moving the product all the way to the tidewater terminals in Portland or Seattle. The average distance was about 65 miles with a range from 1 to 200 miles (Table 14). Fifty percent of the firms were within 50 miles of the nearest facility offering barge loading capability and 75% were within 100 miles (Table 15). The data in Table 16 indicate those that gave no response (.), but based on the previous response this was a correct answer, e.g. they did have barge loading capabilities and therefore shouldn't answer this question. The (m) stands for missing, meaning no answer at all was given and the (d) means some sort of clarifying, but not answering the question, discussion was given. The frequency counts of responses, in Table 17, indicate how often a response, distance in miles, was given.

Similar information was sought about the nearest rail loading capable facility, if the responding facility did not have rail loading capability, and is reported in Tables 18-23. The nearest facility is considerable closer for rail than for barge, as should be expected. The average distance was slightly over 19 miles (barge was 65 miles) with a standard deviation of 18 miles which means 67% of the facilities are within 1-37 miles. Fifty percent of the facilities have rail loading alternatives within 13 miles, as compared to the barge where it was 50 miles, and 75% were within 27 miles as compared to barge which was 100 miles away (Table 21).

The final question under shipping characteristics dealt with the mode of transportation used most often for freight shipments from the location in question. Truck was by far the most common mode used, slightly over 78%, and it was split fairly evenly between private truck (40%) and for-hire truck (38%), as indicated in Table 24. Barge was used by 18, 8.5%, of the facilities and rail was the principal mode for 12.3% of the locations. For the non truck shipments, barge comprised 25% and rail was 63% (Table 25).

### **Shipment Decisions**

The focus of this analysis and much of the Corps demand models is the individual shipper choice. The questionnaire was structured to investigate the shipment decisions and patterns. Accordingly, a series of questions were directed to the very last freight shipment of the respondent.

The commodity shipped in the very last freight shipment is identified in Table 26. The preponderance of grains is apparent, with 183 locations moving grains on their last shipment. It is interesting that the respondents were very consistent with this distribution of last shipments exactly mirroring the responses to "what was the primary commodity shipped from this facility?", described earlier in Table 2.

**Table 18:** How close is the nearest rail loading facility

Q3C	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Don't Know	1	.	.	.
Missing	5	.	.	.
Skipped	91	.	.	.
1	14	12.17	14	12.17
2	5	4.35	19	16.52
3	3	2.61	22	19.13
4	1	0.87	23	20.00
5	4	3.48	27	23.48
6	2	1.74	29	25.22
7	1	0.87	30	26.09
8	6	5.22	36	31.30
9	6	5.22	42	36.52
10	11	9.57	53	46.09
11	1	0.87	54	46.96
12	3	2.61	57	49.57
13	2	1.74	59	51.30
14	1	0.87	60	52.17
15	5	4.35	65	56.52
16	1	0.87	66	57.39
17	2	1.74	68	59.13
18	5	4.35	73	63.48
20	5	4.35	78	67.83
21	1	0.87	79	68.70
22	1	0.87	80	69.57
23	1	0.87	81	70.43
24	1	0.87	82	71.30
25	4	3.48	86	74.78
27	1	0.87	87	75.65
28	2	1.74	89	77.39
30	4	3.48	93	80.87
31	1	0.87	94	81.74
33	1	0.87	95	82.61
35	1	0.87	96	83.48
40	6	5.22	102	88.70
43	1	0.87	103	89.57
45	2	1.74	105	91.30
50	1	0.87	106	92.17
57	1	0.87	107	93.04
61	1	0.87	108	93.91
63	2	1.74	110	95.65
66	1	0.87	111	96.52
69	1	0.87	112	97.39
70	2	1.74	114	99.13
80	1	0.87	115	100.00

**Table 19:** Variable: Q3B (How close is the nearest barge loading facility)

Moments			
N	181	Sum Weights	181
Mean	64.6685083	Sum Observations	11705
Std Deviation	49.1765589	Variance	2418.33395
Skewness	0.8376725	Kurtosis	0.34781047
Uncorrected SS	1192245	Corrected SS	435300.11
Coeff Variation	76.0440595	Std Error Mean	3.65526484

**Table 20:** Basic Statistical Measures

Location		Variability	
Mean	64.66851	Std Deviation	49.17656
Median	50.00000	Variance	2418
Mode	1.00000	Range	249.00000
		Interquartile Range	72.00000

**Table 21:** Quantiles (Definition 5)

Quantile	Estimate
100% Max	250
99%	200
95%	150
90%	130
75% Q3	100
50% Median	50
25% Q1	28
10%	6
5%	1



1% 1  
0% Min 1

**Table 22:** Variable: Q3B (How close is the nearest barge loading facility)

Missing Values			
Missing Value	Count	-----Percent Of----- All Obs	Missing Obs
.	25	11.79	80.65
D	3	1.42	9.68
M	3	1.42	9.68
Total	31	14.62	100.00

**Table 23:** Frequency Counts

Percents				Percents				Percents			
Value	Count	Cell	Cum	Value	Count	Cell	Cum	Value	Count	Cell	Cum
1	13	7.2	7.2	35	1	0.6	33.1	96	1	0.6	70.2
2	2	1.1	8.3	36	4	2.2	35.4	100	12	6.6	76.8
3	1	0.6	8.8	37	1	0.6	35.9	101	1	0.6	77.3
4	1	0.6	9.4	39	2	1.1	37.0	107	1	0.6	77.9
5	1	0.6	9.9	40	5	2.8	39.8	109	1	0.6	78.5
6	1	0.6	10.5	41	3	1.7	41.4	110	4	2.2	80.7
8	1	0.6	11.0	42	1	0.6	42.0	114	2	1.1	81.8
10	1	0.6	11.6	45	7	3.9	45.9	115	1	0.6	82.3
11	1	0.6	12.2	50	13	7.2	53.0	116	1	0.6	82.9
12	1	0.6	12.7	52	1	0.6	53.6	118	1	0.6	83.4
13	1	0.6	13.3	54	2	1.1	54.7	120	7	3.9	87.3
15	3	1.7	14.9	55	3	1.7	56.4	121	1	0.6	87.8
16	1	0.6	15.5	57	1	0.6	56.9	125	1	0.6	88.4
18	1	0.6	16.0	58	1	0.6	57.5	126	1	0.6	89.0

**Table 23 (continued):** Frequency Counts

Percents				Percents				Percents			
Value	Count	Cell	Cum	Value	Count	Cell	Cum	Value	Count	Cell	Cum
19	1	0.6	16.6	60	3	1.7	59.1	130	2	1.1	90.1
20	1	0.6	17.1	63	1	0.6	59.7	137	1	0.6	90.6
21	3	1.7	18.8	65	1	0.6	60.2	140	3	1.7	92.3
22	2	1.1	19.9	69	2	1.1	61.3	142	1	0.6	92.8
24	1	0.6	20.4	70	3	1.7	63.0	145	2	1.1	93.9
25	6	3.3	23.8	72	1	0.6	63.5	147	1	0.6	94.5
26	1	0.6	24.3	75	3	1.7	65.2	150	1	0.6	95.0
28	3	1.7	26.0	78	1	0.6	65.7	151	1	0.6	95.6
29	1	0.6	26.5	80	1	0.6	66.3	161	2	1.1	96.7
30	3	1.7	28.2	82	1	0.6	66.9	166	2	1.1	97.8
31	3	1.7	29.8	84	1	0.6	67.4	178	1	0.6	98.3
32	1	0.6	30.4	90	1	0.6	68.0	200	2	1.1	99.4
33	1	0.6	30.9	92	3	1.7	69.6	250	1	0.6	100.0
34	3	1.7	32.6								

**Table 24:** Type of transportation do you use most often

Q4M1	Frequency	Percent	Cumul ative Frequency	Cumul ative Percent
Private Truck	85	40.09	85	40.09
For-Hire Truck	81	38.21	166	78.30
Barge	18	8.49	184	86.79
Rail	26	12.26	210	99.06
Other	2	0.94	212	100.00

**Table 25:** Type of transportation do you use most often

Q4M3	Frequency	Percent	Cumul ative Frequency	Cumul ative Percent
Skipped	204	.	.	.
Barge	2	25.00	2	25.00
Rail	5	62.50	7	87.50
Other	1	12.50	8	100.00

**Table 26:** Commodity was shipped in your very last freight shipment

	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Q5				
CONSTRUCTION MATERIALS	7	3.30	7	3.30
FERTILIZER	2	0.94	9	4.25
FRESH FRUIT	1	0.47	10	4.72
FUEL	2	0.94	12	5.66
GRAINS	183	86.32	195	91.98
HEAVY EQUIPMENT	1	0.47	196	92.45
HOUSEHOLD PRODUCTS	1	0.47	197	92.92
MANUFACTURED FOOD	4	1.89	201	94.81
MANUFACTURED MATERIALS	3	1.42	204	96.23
WOOD PRODUCTS	8	3.77	212	100.00

Considerable information was sought, in question 6 and its subparts of the questionnaire, as to what modes were physically available at each location, its rate, average time of shipment, variability of on-time shipments, and actual and potential alternative mode usage. This information is critical to estimating the price and quality of service responsiveness of the shipper to mode characteristics. The principal modal combination alternatives in the area, known to the authors from earlier work and knowledge of the industries, were outlined and investigated.

The descriptive statistics and responses are indicated in Tables 28-33 for the truck rate component of the “truck to Pasco and then barge to Portland” modal combination. The average rate was \$9.78 per ton with a standard deviation of \$3.62, meaning 67% of the rates were in the range of \$6.16 to \$13.40 per ton (Tables 29 and 30). Fifty percent of the rates were \$10.00 or less and 75% fell at or below \$12.33 (Table 31). The values in Table 32, especially (. ) indicate that 80 locations did not feel truck to Pasco was economically available to their location. The most common rates quoted were around \$7, \$8 and \$11 (Table 33).

The barge component of the truck to Pasco, barge to Portland is described in Tables 34-39. All responses have been converted into dollars per ton. Almost 70% of the rates were from slightly below \$7 to around \$8, revealing the consistent barge rate from the Pasco pool locations (Table 34). The average rate was \$7.60 per ton with a small standard deviation of \$1.17 (Tables 35 and 36), meaning 67% of the rates were between \$6.43 to \$8.77, again showing the small range in the rates to Portland from the Pasco location. The same finding is evident when examining the results in Table 37, where 25% of the responses are at or below \$7.33 and 75% are at or below \$8.

Speed of service, a quality variable that affects the demand for a mode, was investigated in this survey, using average shipment time for truck to Pasco, barge to Portland (Tables 40-45). The average time of shipment for the total combined movement was slightly over 11 days but with some significant variation since the standard deviation was over 9 days (Table 42). The median was 7 days but 75% were within 15 days, suggesting again significant variation. The most common estimates were 5,7,15, and 30 days (Table 45).

The reliability of the alternative modal combinations was also investigated by inquiring as to the percent of the time shipments arrive on time at the final destination. Tables 26-51 report the results and the descriptive statistics. The average on time experience was 77% with a standard deviation of about 19 percent, meaning that 67% of the shipments arrived on time from 58% to 96% of the time, in the experiences of the respondents. The reliability of this combination is indicated by the fact that up to 50%

**Table 27:** Available : Truck to Pasco then Barge to Portland

Q6A1	Frequency	Percent	Cumul ative Frequency	Cumul ative Percent
Missi ng	2	.	.	.
Yes	130	61.90	130	61.90
No	80	38.10	210	100.00

**Table 28:** Transportation rate: Truck to Pasco

Q6B1T	Frequency	Percent	Cumul ative Frequency	Cumul ative Percent
Don' t Know	5	.	.	.
Missi ng	4	.	.	.
Skipped	80	.	.	.
2	1	0.81	1	0.81
2.56	1	0.81	2	1.63
2.78	1	0.81	3	2.44
2.79	1	0.81	4	3.25
3.99	4	3.25	8	6.50
4	3	2.44	11	8.94
4.99	1	0.81	12	9.76
5.33	2	1.63	14	11.38
6	4	3.25	18	14.63
6.66	11	8.94	29	23.58
7	1	0.81	30	24.39
7.6	1	0.81	31	25.20
7.66	5	4.07	36	29.27
8	2	1.63	38	30.89
8.33	12	9.76	50	40.65
8.5	1	0.81	51	41.46
8.66	5	4.07	56	45.53
9.33	3	2.44	59	47.97
9.66	1	0.81	60	48.78
10	5	4.07	65	52.85
10.33	1	0.81	66	53.66
10.66	14	11.38	80	65.04
11.33	1	0.81	81	65.85
11.66	5	4.07	86	69.92
11.99	5	4.07	91	73.98
12.33	9	7.32	100	81.30
12.66	3	2.44	103	83.74
12.91	1	0.81	104	84.55
13.33	6	4.88	110	89.43
13.66	1	0.81	111	90.24
14	1	0.81	112	91.06
14.66	2	1.63	114	92.68
14.99	1	0.81	115	93.50
15.33	1	0.81	116	94.31
15.99	2	1.63	118	95.93
16.66	2	1.63	120	97.56
20	3	2.44	123	100.00

**Table 29:** Variable: Q6B1T (Transportation rate: Truck to Pasco)

Moments			
N	123	Sum Weights	123
Mean	9.7796748	Sum Observations	1202.9
Std Deviation	3.61571092	Variance	13.0733655
Skewness	0.31247802	Kurtosis	0.341895
Uncorrected SS	13358.9214	Corrected SS	1594.95059
Coeff Variation	36.9716887	Std Error Mean	0.32601767

**Table 30:** Basic Statistical Measures

Location	Mean	Std Deviation	Variability
Columbia/Snake River Transportation Study	9.77967	3.61571	
Casavant and Jessup May 2005			

Median	10.00000	Variance	13.07337
Mode	10.66000	Range	18.00000
		Interquartile Range	4.73000

**Table 31:** Quantiles (Definition 5)

Quantile	Estimate
100% Max	20.00
99%	20.00
95%	15.99
90%	13.66
75% Q3	12.33
50% Median	10.00
25% Q1	7.60
10%	5.33
5%	3.99
1%	2.56
0% Min	2.00

**Table 32:** Variable: Q6B1T (Transportation rate: Truck to Pasco)

Missing Values			
Missing Value	Count	-----Percent Of-----	
		All Obs	Missing Obs
.	80	37.74	89.89
D	5	2.36	5.62
M	4	1.89	4.49
Total	89	41.98	100.00

**Table 33:** Frequency Counts

Percents				Percents				Percents			
Value	Count	Cell	Cum	Value	Count	Cell	Cum	Value	Count	Cell	Cum
2	1	0.8	0.8	8	2	1.6	30.9	12	9	7.3	81.3
3	1	0.8	1.6	8	12	9.8	40.7	13	3	2.4	83.7
3	1	0.8	2.4	9	1	0.8	41.5	13	1	0.8	84.6
3	1	0.8	3.3	9	5	4.1	45.5	13	6	4.9	89.4
4	4	3.3	6.5	9	3	2.4	48.0	14	1	0.8	90.2
4	3	2.4	8.9	10	1	0.8	48.8	14	1	0.8	91.1
5	1	0.8	9.8	10	5	4.1	52.8	15	2	1.6	92.7
5	2	1.6	11.4	10	1	0.8	53.7	15	1	0.8	93.
6	4	3.3	14.6	11	14	11.4	65.0	15	1	0.8	94.3
7	11	8.9	23.6	11	1	0.8	65.9	16	2	1.6	95.9
7	1	0.8	24.4	12	5	4.1	69.9	17	2	1.6	97.6
8	1	0.8	25.2	12	5	4.1	74.0	20	3	2.4	100.0
8	5	4.1	29.3								

**Table 34:** Transportation rate: Barge from Pasco

Q6B1B	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Don't Know	6	.	.	.
Missing	6	.	.	.
Skipped	80	.	.	.
0	1	0.83	1	0.83
4.08	1	0.83	2	1.67
6	2	1.67	4	3.33
6.05	1	0.83	5	4.17
6.6	1	0.83	6	5.00
6.66	11	9.17	17	14.17
6.8	3	2.50	20	16.67
7	8	6.67	28	23.33
7.33	18	15.00	46	38.33
7.4	1	0.83	47	39.17
7.66	22	18.33	69	57.50
7.99	21	17.50	90	75.00
8	22	18.33	112	93.33
9.33	2	1.67	114	95.00
9.66	1	0.83	115	95.83
9.99	1	0.83	116	96.67
10	1	0.83	117	97.50
11	2	1.67	119	99.17
12	1	0.83	120	100.00

**Table 35:** Variable: Q6B1B (Transportation rate: Barge from Pasco)

Moments			
N	120	Sum Weights	120
Mean	7.60291667	Sum Observations	912.35
Std Deviation	1.17936915	Variance	1.39091159
Skewness	-1.5456494	Kurtosis	16.4242892
Uncorrected SS	7102.0395	Corrected SS	165.518479
Coeff Variation	15.512062	Std Error Mean	0.10766118

**Table 36:** Basic Statistical Measures

Location		Variability	
Mean	7.602917	Std Deviation	1.17937
Median	7.660000	Variance	1.39091
Mode	7.660000	Range	12.00000
		Interquartile Range	0.66500

**Table 37:** Quantiles (Definition 5)

Quantile	Estimate
100% Max	12.000
99%	11.000
95%	9.495
90%	8.000
75% Q3	7.995
50% Median	7.660
25% Q1	7.330
10%	6.660

5% 6.630  
 1% 4.080  
 0% Min 0.000

**Table 38:** Variable: Q6B1B (Transportation rate: Barge from Pasco)

Missing Values			
Missing Value	Count	----Percent All Obs	OF---- Missing Obs
.	80	37.74	86.96
D	6	2.83	6.52
M	6	2.83	6.52
Total	92	43.40	100.00

**Table 39:** Frequency Counts

Percents				Percents				Percents			
Value	Count	Cell	Cum	Value	Count	Cell	Cum	Value	Count	Cell	Cum
0	1	0.8	0.8	7	8	6.7	23.3	9	2	1.7	95.0
4	1	0.8	1.7	7	18	15.0	38.3	10	1	0.8	95.8
6	2	1.7	3.3	7	1	0.8	39.2	10	1	0.8	96.7
6	1	0.8	4.2	8	22	18.3	57.5	10	1	0.8	97.5
7	1	0.8	5.0	8	21	17.5	75.0	11	2	1.7	99.2
7	11	9.2	14.2	8	22	18.3	93.3	12	1	0.8	100.0
7	3	2.5	16.7								

**Table 40:** Average shipment time: Truck to Pasco then Barge to Portland

Q6C1	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Don't Know	3	.	.	.
Missing	6	.	.	.
Skipped	80	.	.	.
1	6	4.88	6	4.88
2	3	2.44	9	7.32
3	5	4.07	14	11.38
4	4	3.25	18	14.63
5	19	15.45	37	30.08
6	3	2.44	40	32.52
7	35	28.46	75	60.98
9	1	0.81	76	61.79
10	7	5.69	83	67.48
15	20	16.26	103	83.74
30	20	16.26	123	100.00

**Table 41:** Variable: Q6C1 (Average shipment time: Truck to Pasco then Barge to Portland)

Moments			
N	123	Sum Weights	123
Mean	11.2195122	Sum Observations	1380
Std Deviation	9.15399813	Variance	83.7956817
Skewness	1.22608105	Kurtosis	0.17998505
Uncorrected SS	25706	Corrected SS	10223.0732
Coeff Variation	81.5899833	Std Error Mean	0.82538821

**Table 42:** Basic Statistical Measures

Location		Variability	
Mean	11.21951	Std Deviation	9.15400
Median	7.00000	Variance	83.79568

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*Columbia/Snake River Transportation Study* 29 *Casavant and Jessup May 2005*

Mode 7.00000 Range 29.00000  
 Interquartile Range 10.00000

**Table 43:** Quantiles (Definition 5)

Quantile	Estimate
100% Max	30
99%	30
95%	30
90%	30
75% Q3	15
50% Median	7
25% Q1	5
10%	3
5%	2
1%	1
0% Min	1

**Table 44:** Variable: Q6C1 (Average shipment time: Truck to Pasco then Barge to Portland)

Missing Values

Missing Value	Count	-----Percent Of-----	
		All Obs	Missing Obs
.	80	37.74	89.89
D	3	1.42	3.37
M	6	2.83	6.74
Total	89	41.98	100.00

**Table 45:** Frequency Counts

Percents				Percents				Percents			
Value	Count	Cell	Cum	Value	Count	Cell	Cum	Value	Count	Cell	Cum
1	6	4.9	4.9	5	19	15.4	30.1	10	7	5.7	67.5
2	3	2.4	7.3	6	3	2.4	32.5	15	20	16.3	83.7
3	5	4.1	11.4	7	35	28.5	61.0	30	20	16.3	100.0
4	4	3.3	14.6	9	1	0.8	61.8				

**Table 46:** Percent of on time arrive : Truck to Pasco then Barge to Portland

Q6D1	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Don't Know	17	.	.	.
Missing	13	.	.	.
Skipped	80	.	.	.
0	3	2.94	3	2.94
50	6	5.88	9	8.82
60	10	9.80	19	18.63
75	34	33.33	53	51.96
80	5	4.90	58	56.86
85	2	1.96	60	58.82
90	33	32.35	93	91.18
98	1	0.98	94	92.16
99	4	3.92	98	96.08
100	4	3.92	102	100.00

**Table 47:** Variable: Q6D1 (Percent of on time arrive : Truck to Pasco then Barge to Portland)

Moments

N	102	Sum Weights	102
Mean	77.2941176	Sum Observations	7884
Std Deviation	18.7271118	Variance	350.704718
Skewness	-2.1437964	Kurtosis	6.67377472
Uncorrected SS	644808	Corrected SS	35421.1765
Coeff Variation	24.2283791	Std Error Mean	1.85426038



**Table 48:** Basic Statistical Measures

Location		Variability	
Mean	77.29412	Std Deviation	18.72711
Median	75.00000	Variance	350.70472
Mode	75.00000	Range	100.00000
		Interquartile Range	15.00000

**Table 49:** Quantiles (Definition 5)

Quantile	Estimate
100% Max	100
99%	100
95%	99
90%	90
75% Q3	90
50% Median	75
25% Q1	75
10%	60
5%	50
1%	0
0% Min	0

**Table 50:** Variable: Q6D1 (Percent of on time arrive : Truck to Pasco then Barge to Portland)

Missing Values			
Missing Value	Count	Percent of All Obs	Percent of Missing Obs
.	80	37.74	72.73
D	17	8.02	15.45
M	13	6.13	11.82
Total	110	51.89	100.00

**Table 51:** Frequency Counts

Percents				Percents				Percents			
Value	Count	Cell	Cum	Value	Count	Cell	Cum	Value	Count	Cell	Cum
0	3	2.9	2.9	80	5	4.9	56.9	98	1	1.0	92.2
50	6	5.9	8.8	85	2	2.0	58.8	99	4	3.9	96.1
60	10	9.8	18.6	90	33	32.4	91.2	100	4	3.9	100.0
75	34	33.3	52.0								

**Table 52:** Available : Truck to river port then Barge

Q6A2	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Missing	9			
Yes	116	57.14	116	57.14
No	87	42.86	203	100.00

of the respondents felt 75% was their experience and 75% felt that 90% or less of the shipments were on time (Table 49).

Similar analysis was undertaken for ports other than Pasco, as reported in Tables 52 and 53. Over 57% of the locations had this combination available to them. The ports identified as being used were 13 in number. Windust, Central Ferry and Almoda were the most common with 25%, 19% and 15%, respectively. The truck transportation rate to the identified river port averaged \$5.63 per ton, with a fairly wide standard deviation of \$3.27, meaning that to include 67% of the responses would require a range of

\$2.36 to \$8.90. Fifty percent of the responses were at or below \$4.66 (Table 57). It is evident how distance affects the rates since the average truck rate to Pasco was \$9.78 as contrasted to the \$5.63 for ports closer to the locations of the respondents.

The barge rate from ports other than Pasco, also identified in the survey and described in Tables 60-65, averaged \$8.09 per ton with a fairly small standard deviation of \$1.88, meaning that 67% of the responses were between \$6.21 and \$9.97 per ton. Half of the locations had rates of \$7.33 or less for the barge segment of this combination (Table 63). Again, distance is a powerful variable because these ports, farther up stream than Pasco, have an average per ton rate that is higher than the \$7.60 per ton for the Pasco movements.

The quality of service for non Pasco shipments, measured by average shipment time from shipping location to Portland, was on average 4.14 days, as reported by the respondents (Tables 67 and 68). There was significant variation as evidenced by a standard deviation of 2.83 days and a median of only 3 days, meaning 50% of the responses were at or below 3 days (Table 69). Again, as indicated in Table 70, 87 of the respondents did not consider this a viable alternative for their location.

This alternative was also examined for variability in transit time (Table 72). Reliability was judged extremely high with an average of over 90% on time delivery, with a reasonable standard deviation of 12%. Fifty percent felt the combination was on time up to 90% of the time and 75% felt that 100% or less of the shipments were usually on time (Table 75). Interestingly, the most common estimates were 90% and 100% on time delivery, with 30 and 38 respondents, respectively (Table 77).

Another alternative mode combination was rail to Portland. Seventy one, 35% of the respondents had this combination available to them at their identified location (Table 78). The other locations served as a collector role, using either truck to rail or truck to barge as their overall movement. The rail to Portland rate was also identified (Table 79) and put on a dollar per ton basis. The average rate to Portland by rail

**Table 53:** Truck to river port other than Pasco

Q6POT	Frequency	Percent	Cumul ative Frequency	Cumul ative Percent
ALMOTA	15	13.16	15	13.16
BIGGS, OR	3	2.63	18	15.79
BOARDMAN	2	1.75	20	17.54
BOARDMAN, OR	1	0.88	21	18.42
BURBANK	1	0.88	22	19.30
CARGILL	1	0.88	23	20.18
CENTRAL FERRY	22	19.30	45	39.47
LEWISTON	11	9.65	56	49.12
LONGVIEW	1	0.88	57	50.00
M	3	2.63	60	52.63
MCNARY	1	0.88	61	53.51
POMEROY GRAIN GROWERS	1	0.88	62	54.39
PORT ALMOTA	2	1.75	64	56.14
ROOSEVELT	1	0.88	65	57.02
S-17-A	1	0.88	66	57.89
SHEFFLER	10	8.77	76	66.67
UMATI LLA	1	0.88	77	67.54
WALLULA	8	7.02	85	74.56
WILMA	1	0.88	86	75.44
WINDUST	28	24.56	114	100.00

**Table 54:** Transportation rate: Truck to river port

Q6B2T	Frequency	Percent	Cumul ative Frequency	Cumul ative Percent
Don't Know	2	.	.	.
Missing	11	.	.	.
Skipped	87	.	.	.
0	1	0.89	1	0.89
1	2	1.79	3	2.68
1.05	4	3.57	7	6.25
1.11	1	0.89	8	7.14
1.66	1	0.89	9	8.04
2.33	1	0.89	10	8.93
2.66	3	2.68	13	11.61
2.85	2	1.79	15	13.39
3	5	4.46	20	17.86
3.16	1	0.89	21	18.75
3.24	1	0.89	22	19.64
3.33	2	1.79	24	21.43
3.5	1	0.89	25	22.32
3.66	11	9.82	36	32.14
3.99	8	7.14	44	39.29
4	5	4.46	49	43.75
4.17	1	0.89	50	44.64
4.33	3	2.68	53	47.32
4.58	1	0.89	54	48.21
4.66	4	3.57	58	51.79
4.99	1	0.89	59	52.68
5	5	4.46	64	57.14
5.2	1	0.89	65	58.04
5.33	3	2.68	68	60.71
5.66	2	1.79	70	62.50
6	5	4.46	75	66.9

**Table 54 (continued):** Transportation rate: Truck to river port

Q6B2T	Frequency	Percent	Cumul ative Frequency	Cumul ative Percent
6.24	1	0.89	76	67.86
6.33	6	5.36	82	73.21
6.66	1	0.89	83	74.11
7.33	3	2.68	86	76.79
7.6	1	0.89	87	77.68
8	4	3.57	91	81.25
8.13	1	0.89	92	82.14
8.66	2	1.79	94	83.93
9	1	0.89	95	84.82
10	3	2.68	98	87.50
10.66	4	3.57	102	91.07
11.66	5	4.46	107	95.54
12.6	1	0.89	108	96.43
12.66	1	0.89	109	97.32
15	2	1.79	111	99.11
15.33	1	0.89	112	100.00

**Table 55:** Variable: Q6B2T (Transportation rate: Truck to river port)

Moments			
N	112	Sum Weights	112
Mean	5.62544643	Sum Observations	630.05
Std Deviation	3.26795522	Variance	10.6795313
Skewness	1.03033013	Kurtosis	0.70241736
Uncorrected SS	4729.7405	Corrected SS	1185.42798
Coeff Variation	58.0923712	Std Error Mean	0.30879274

**Table 56:** Basic Statistical Measures

Location		Variability	
Mean	5.625446	Std Deviation	3.26796
Median	4.660000	Variance	10.67953
Mode	3.660000	Range	15.33000
		Interquartile Range	3.67000

**Table 57:** Quantiles (Definition 5)

Quantile	Estimate
100% Max	15.33
99%	15.00
95%	11.66
90%	10.66
75% Q3	7.33
50% Median	4.66
25% Q1	3.66
10%	2.66
5%	1.05
1%	1.00
0% Min	0.00

**Table 58:** Variable: Q6B2T (Transportation rate: Truck to river port)

Missing Values			
Missing Value	Count	Percent of All Obs	Percent of Missing Obs
.	87	41.04	87.00
D	2	0.94	2.00
M	11	5.19	11.00
Total	100	47.17	100.00

**Table 59:** Frequency Counts

Percents				Percents				Percents			
Value	Count	Cell	Cum	Value	Count	Cell	Cum	Value	Count	Cell	Cum
0	1	0.9	0.9	4	8	7.1	39.3	7	1	0.9	74.1
1	2	1.8	2.7	4	5	4.5	43.8	7	3	2.7	76.8
1	4	3.6	6.3	4	1	0.9	44.6	8	1	0.9	77.7
1	1	0.9	7.1	4	3	2.7	47.3	8	4	3.6	81.3
2	1	0.9	8.0	5	1	0.9	48.2	8	1	0.9	82.1
2	1	0.9	8.9	5	4	3.6	51.8	9	2	1.8	83.9
3	3	2.7	11.6	5	1	0.9	52.7	9	1	0.9	84.8
3	2	1.8	13.4	5	5	4.5	57.1	10	3	2.7	87.5
3	5	4.5	17.9	5	1	0.9	58.0	11	4	3.6	91.1
3	1	0.9	18.8	5	3	2.7	60.7	12	5	4.5	95.5
3	1	0.9	19.6	6	2	1.8	62.5	13	1	0.9	96.4
3	2	1.8	21.4	6	5	4.5	67.0	13	1	0.9	97.3
4	1	0.9	22.3	6	1	0.9	67.9	15	2	1.8	99.1
4	11	9.8	32.1	6	6	5.4	73.2	15	1	0.9	100.0

**Table 60:** Transportation rate: Barge from other port

Q6B2B	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Don't Know	5	.	.	.
Missing	12	.	.	.
Skipped	87	.	.	.
0	1	0.93	1	0.93
3.22	1	0.93	2	1.85
4.53	1	0.93	3	2.78

4.66	1	0.93	4	3.70
6	1	0.93	5	4.63
6.23	1	0.93	6	5.56
6.33	2	1.85	8	7.41
6.66	9	8.33	17	15.74
7.33	45	41.67	62	57.41
7.4	1	0.93	63	58.33
7.41	3	2.78	66	61.11
7.75	1	0.93	67	62.04
7.99	2	1.85	69	63.89
8.33	6	5.56	75	69.44
8.39	1	0.93	76	70.37
8.4	2	1.85	78	72.22
9.66	1	0.93	79	73.15
10	2	1.85	81	75.00

**Table 60 (continued):** Transportation rate: Barge from other port

Q6B2B	Frequency	Percent	Cumulative Frequency	Cumulative Percent
10.33	20	18.52	101	93.52
10.66	3	2.78	104	96.30
11.6	1	0.93	105	97.22
11.8	1	0.93	106	98.15
13	2	1.85	108	100.00

**Table 61:** Variable: Q6B2B (Transportation rate: Barge from other port)

Moments			
N	108	Sum Weights	108
Mean	8.08574074	Sum Observations	873.26
Std Deviation	1.8817258	Variance	3.54089197
Skewness	-0.2496969	Kurtosis	2.7611797
Uncorrected SS	7439.8294	Corrected SS	378.875441
Coeff Variation	23.272151	Std Error Mean	0.18106915

**Table 62:** Basic Statistical Measures

Location		Variability	
Mean	8.085741	Std Deviation	1.88173
Median	7.330000	Variance	3.54089
Mode	7.330000	Range	13.00000
		Interquartile Range	2.83500

**Table 63:** Quantiles (Definition 5)

Quantile	Estimate
100% Max	13.000
99%	13.000
95%	10.660
90%	10.330
75% Q3	10.165
50% Median	7.330
25% Q1	7.330
10%	6.660
5%	6.230
1%	3.220
0% Min	0.000

**Table 64:** Variable: Q6B2B (Transportation rate: Barge from other port)

Missing Value	Count	Missing Values	
		Percent	Of Missing Obs
.	87	41.04	83.65
D	5	2.36	4.81
M	12	5.66	11.54
Total	104	49.06	100.00

**Table 65:** Frequency Counts

Percents				Percents				Percents			
Value	Count	Cell	Cum	Value	Count	Cell	Cum	Value	Count	Cell	Cum
0	1	0.9	0.9	7	45	41.7	57.4	10	1	0.9	73.1

3	1	0.9	1.9	7	1	0.9	58.3	10	2	1.9	75.0
5	1	0.9	2.8	7	3	2.8	61.1	10	20	18.5	93.5
5	1	0.9	3.7	8	1	0.9	62.0	11	3	2.8	96.3
6	1	0.9	4.6	8	2	1.9	63.9	12	1	0.9	97.2
6	1	0.9	5.6	8	6	5.6	69.4	12	1	0.9	98.1
6	2	1.9	7.4	8	1	0.9	70.4	13	2	1.9	100.0
7	9	8.3	15.7	8	2	1.9	72.2				

**Table 66:** Average shipment time: Truck to river port then Barge

Q6C2	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Don't Know	1	.	.	.
Missing	13	.	.	.
Skipped	87	.	.	.
1	26	23.42	26	23.42
2	6	5.41	32	28.83
3	31	27.93	63	56.76
4	5	4.50	68	61.26
5	11	9.91	79	71.17
6	1	0.90	80	72.07
7	16	14.41	96	86.49
8	11	9.91	107	96.40
10	2	1.80	109	98.20
12	1	0.90	110	99.10
15	1	0.90	111	100.00

**Table 67:** Variable: Q6C2 (Average shipment time: Truck to river port then Barge)

Moments			
N	111	Sum Weights	111
Mean	4.13513514	Sum Observations	459
Std Deviation	2.82677615	Variance	7.99066339
Skewness	0.93954423	Kurtosis	0.88073319
Uncorrected SS	2777	Corrected SS	878.972973
Coeff Variation	68.3599461	Std Error Mean	0.26830572

**Table 68:** Basic Statistical Measures

Location		Variability	
Mean	4.135135	Std Deviation	2.82678
Median	3.000000	Variance	7.99066
Mode	3.000000	Range	14.00000
		Interquartile Range	5.00000

**Table 69:** Quantiles (Definition 5)

Quantile	Estimate
100% Max	15
99%	12
95%	8
90%	8
75% Q3	7
50% Median	3
25% Q1	2
10%	1
5%	1
1%	1
0% Min	1

**Table 70:** Variable: Q6C2 (Average shipment time: Truck to river port then Barge)

Missing Values			
Missing Value	Count	-----Percent Of-----	
		All Obs	Missing Obs
.	87	41.04	86.14
D	1	0.47	0.99
M	13	6.13	12.87
Total	101	47.64	100.00

**Table 71:** Frequency Counts

Percents				Percents				Percents			
Value	Count	Cell	Cum	Value	Count	Cell	Cum	Value	Count	Cell	Cum
1	26	23.4	23.4	5	11	9.9	71.2	10	2	1.8	98.2
2	6	5.4	28.8	6	1	0.9	72.1	12	1	0.9	99.1
3	31	27.9	56.8	7	16	14.4	86.5	15	1	0.9	100.0
4	5	4.5	61.3	8	11	9.9	96.4				

**Table 72:** Percent of on time arrive: Truck to river port then Barge

Q6D2	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Don't Know	5	.	.	.
Missing	31	.	.	.
Skipped	87	.	.	.
60	10	11.24	10	11.24
75	4	4.49	14	15.73
80	2	2.25	16	17.98
90	30	33.71	46	51.69
97	1	1.12	47	52.81
98	1	1.12	48	53.93
99	3	3.37	51	57.30
100	38	42.70	89	100.00

**Table 73:** Variable: Q6D2 (Percent of on time arrive: Truck to river port then Barge)

Moments			
N	89	Sum Weights	89
Mean	90.4719101	Sum Observations	8052
Std Deviation	12.7190711	Variance	161.77477
Skewness	-1.4950226	Kurtosis	1.17580547
Uncorrected SS	742716	Corrected SS	14236.1798
Coeff Variation	14.0585858	Std Error Mean	1.34821884

**Table 74:** Basic Statistical Measures

Location		Variability	
Mean	90.4719	Std Deviation	12.71907
Median	90.0000	Variance	161.77477
Mode	100.0000	Range	40.00000
		Interquartile Range	10.00000

**Table 75:** Quantiles (Definition 5)

Quantile	Estimate
100% Max	100
99%	100
95%	100
90%	100
75% Q3	100
50% Median	90
25% Q1	90
10%	60
5%	60
1%	60
0% Min	60

**Table 76:** Variable: Q6D2 (Percent of on time arrive: Truck to river port then Barge)

Missing Values			
Missing Value	Count	Percent of All Obs	Percent of Missing Obs
.	87	41.04	70.73
D	5	2.36	4.07
M	31	14.62	25.20
Total	123	58.02	100.00

**Table 77:**

Frequency Counts				Percents			
Value	Count	Cell	Cum	Value	Count	Cell	Cum
60	10	11.2	11.2	90	30	33.7	51.7
75	4	4.5	15.7	97	1	1.1	52.8
80	2	2.2	18.0	98	1	1.1	53.9
				99	3	3.4	57.3
				100	38	42.7	100.0

**Table 78:**

Available : Rail to Portland

Q6A3	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Missing	8	.	.	.
Yes	71	34.80	71	34.80
No	133	65.20	204	100.00

**Table 79:**

Transportation rate: Rail to Portland

Q6B3R	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Don't Know	3	.	.	.
Missing	11	.	.	.
Skipped	133	.	.	.
1.6	1	1.54	1	1.54
9.5	1	1.54	2	3.08
9.68	1	1.54	3	4.62
9.99	1	1.54	4	6.15
10.5	3	4.62	7	10.77
10.99	5	7.69	12	18.46
11	1	1.54	13	20.00
11.33	1	1.54	14	21.54
11.5	1	1.54	15	23.08
11.99	1	1.54	16	24.62
12	1	1.54	17	26.15
12.66	2	3.08	19	29.23
12.99	2	3.08	21	32.31
13	1	1.54	22	33.85
13.23	1	1.54	23	35.38
13.29	1	1.54	24	36.92
13.33	5	7.69	29	44.6
13.35	1	1.54	30	46.15
13.66	6	9.23	36	55.38
13.87	1	1.54	37	56.92
13.99	7	10.77	44	67.69
14.33	3	4.62	47	72.31
14.66	3	4.62	50	76.92
14.99	5	7.69	55	84.62
15.23	2	3.08	57	87.69
16.5	2	3.08	59	90.77
17	1	1.54	60	92.31
18.48	1	1.54	61	93.85
22.5	1	1.54	62	95.38
22.99	1	1.54	63	96.92
26.66	1	1.54	64	98.46
36.29	1	1.54	65	100.00

**Table 80:**

Variable: Q6B3R (Transportation rate: Rail to Portland)

Moments			
N	65	Sum Weights	65
Mean	13.9833846	Sum Observations	908.92
Std Deviation	4.31862003	Variance	18.650479
Skewness	2.43490426	Kurtosis	12.2176894
Uncorrected SS	13903.4086	Corrected SS	1193.63066
Coeff Variation	30.8839394	Std Error Mean	0.5356

**Table 81:**

Basic Statistical Measures



Location		Variability	
Mean	13.98338	Std Deviation	4.31862
Median	13.66000	Variance	18.65048
Mode	13.99000	Range	34.69000
		Interquartile Range	2.66000

**Table 82:** Quantiles (Definition 5)

Quantile	Estimate
100% Max	36.29
99%	36.29
95%	22.50
90%	16.50
75% Q3	14.66
50% Median	13.66
25% Q1	12.00
10%	10.50
5%	9.99
1%	1.60
0% Min	1.60

was almost \$14, with a standard deviation of \$4.32 cents, meaning that 67% of the rates were between \$9.68 and \$18.32 (Tables 80 and 81). The median rate was \$13.66, meaning there were as many rates above this number as there was below (Table 82). The maximum rate, \$36.29 reflects a commodity that is light loaded and odd size, leading to a significantly higher per ton rate. The most common rate quote was \$14 per ton, followed by \$13, \$11 and \$15 (Table 84).

The average shipment time for rail to Portland was an average of 10.4 days but with a rather large standard deviation of 9.65 days, suggesting that respondents experienced significantly different service from the railroads (Tables 86 and 87). The median experience was only 7 days, significantly less than the average, reflecting those outlier estimates of 45 and 60 days, and numerous 20 and 21 day estimates (Table 88). By far the most common experiences were either 5, 7 or 12 days (Table 90).

The reliability of rail is reflected in its on time arrivals (Table 91), and it also shows a great deal of differing experiences. The average on time experience was 63% with a standard deviation of about 18 percent. The median estimate was 65 % suggesting a fairly normal distribution in this variable. The most common estimate was 75%, followed by 65% and 50% (Table 96). It is interesting that the rail reliability and speed of delivery were notably less than the combinations that utilize barge movements.

A common movement is for a small elevator to truck product to a railroad siding/elevator where lower cost multiple car rates are available and then to send the grain by rail to Portland (Table 97). This alternative was identified as available by 108 of the survey respondents, slightly less than 53%. Attention in the questionnaire was paid to the separate truck and rail rates. The frequency of the rate quotes for the truck leg of the movement, in dollars per ton, is indicated in Table 98 with Tables 99-103 providing more descriptive statistics. The average truck rate to the railroad was \$4.36 but with significant variation (Tables 99 and 100). The median estimate was \$3, significantly less than the average revealing the existence of high estimates for some movements, again probably due to some of the non grain commodities being of high value and carrying a high truck rate. By far the most common estimates were \$3 and \$2 (Table 103).

The rail rate in the truck to rail and then rail to Portland combination was also collected in the survey and is presented in dollars per ton in Table 104. The average rate was \$10.66 with a standard deviation of \$3.22 (Tables 105 and 106). The median rate was estimated at \$10.99, again suggesting a fairly normal distribution (Table 107). It should be noted that this combination identified a rail rate that was significantly lower than direct rail to Portland, discussed above with an average rate of \$14. This indicates that this combination is accessing the lower cost 25 car rail rates and even some of the 110-car rail rates.

**Table 83:** Variable: Q6B3R (Transportation rate: Rail to Portland)

Missing Values			
Missing Value	Count	-----Percent Of-----	
		All Obs	Missing Obs
.	133	62.74	90.48
D	3	1.42	2.04
M	11	5.19	7.48
Total	147	69.34	100.00

**Table 84:** Frequency Counts

Percents				Percents				Percents			
Value	Count	Cell	Cum	Value	Count	Cell	Cum	Value	Count	Cell	Cum
2	1	1.5	1.5	13	2	3.1	29.2	15	3	4.6	76.9
10	1	1.5	3.1	13	2	3.1	32.3	15	5	7.7	84.6
10	1	1.5	4.6	13	1	1.5	33.8	15	2	3.1	87.7
10	1	1.5	6.2	13	1	1.5	35.4	17	2	3.1	90.8
11	3	4.6	10.8	13	1	1.5	36.9	17	1	1.5	92.3
11	5	7.7	18.5	13	5	7.7	44.6	18	1	1.5	93.8
11	1	1.5	20.0	13	1	1.5	46.2	23	1	1.5	95.4
11	1	1.5	21.5	14	6	9.2	55.4	23	1	1.5	96.9
12	1	1.5	23.1	14	1	1.5	56.9	27	1	1.5	98.5
12	1	1.5	24.6	14	7	10.8	67.7	36	1	1.5	100.0
12	1	1.5	26.2	14	3	4.6	72.3				

**Table 85:** Average shipment time: Rail to Portland

Q6C3	Frequency	Percent	Cumul ative Frequency	Cumul ative Percent
Missing	133	.	.	.
Skipped	133	.	.	.
2	1	1.52	1	1.52
3	3	4.55	4	6.06
5	13	19.70	17	25.76
6	11	16.67	28	42.42
7	12	18.18	40	60.61
8	4	6.06	44	66.67
10	9	13.64	53	80.30
20	5	7.58	58	87.88
21	5	7.58	63	95.45
30	1	1.52	64	96.97
45	1	1.52	65	98.48
60	1	1.52	66	100.00

**Table 86:** Variable: Q6C3 (Average shipment time: Rail to Portland)

Moments			
N	66	Sum Weights	66
Mean	10.4242424	Sum Observations	688
Std Deviation	9.6509236	Variance	93.1403263
Skewness	3.09922381	Kurtosis	11.934828
Uncorrected SS	13226	Corrected SS	6054.12121
Coeff Variation	92.5815345	Std Error Mean	1.18794658

**Table 87:** Basic Statistical Measures

Location		Variability	
Mean	10.42424	Std Deviation	9.65092
Median	7.00000	Variance	93.14033
Mode	5.00000	Range	58.00000
		Interquartile Range	5.00000

**Table 88:** Quantiles (Definition 5)

Quantile	Estimate
100% Max	60
99%	60
95%	21
90%	21
75% Q3	10
50% Median	7
25% Q1	5
10%	5
5%	3
1%	2
0% Min	2

**Table 89:** Variable: Q6C3 (Average shipment time: Rail to Portland)

Missing Values			
Missing Value	Count	Percent of All Obs	Percent of Missing Obs
.	133	62.74	91.10
M	13	6.13	8.90
Total	146	68.87	100.00

**Table 90:** Frequency Counts

Percents				Percents				Percents			
Value	Count	Cell	Cum	Value	Count	Cell	Cum	Value	Count	Cell	Cum
2	1	1.5	1.5	7	12	18.2	60.6	21	5	7.6	95.5
3	3	4.5	6.1	8	4	6.1	66.7	30	1	1.5	97.0
5	13	19.7	25.8	10	9	13.6	80.3	45	1	1.5	98.5
6	11	16.7	42.4	20	5	7.6	87.9	60	1	1.5	100.0

**Table 91:** Percent of on time arrive: Rail to Portland

Q6D3	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Don't Know	3	.	.	.
Missing	12	.	.	.
Skipped	133	.	.	.
10	3	4.69	3	4.69
20	1	1.56	4	6.25
40	1	1.56	5	7.81
50	10	15.63	15	23.44
55	3	4.69	18	28.13
60	7	10.94	25	39.06
65	11	17.19	36	56.25
70	6	9.38	42	65.63
75	15	23.44	57	89.06
80	3	4.69	60	93.75
85	2	3.13	62	96.88
100	2	3.13	64	100.00

**Table 92:** Variable: Q6D3 (Percent of on time arrive: Rail to Portland)

Moments			
N	64	Sum Weights	64
Mean	63.203125	Sum Observations	4045
Std Deviation	17.7363224	Variance	314.577133
Skewness	-1.2001351	Kurtosis	2.63663767
Uncorrected SS	275475	Corrected SS	19818.3594
Coeff Variation	28.0624137	Std Error Mean	2.2170403

**Table 93:** Basic Statistical Measures

Location		Variability	
Mean	63.20313	Std Deviation	17.73632
Median	65.00000	Variance	314.57713
Mode	75.00000	Range	90.00000
		Interquartile Range	20.00000

**Table 94:** Quantiles (Definition 5)

Quantile	Estimate
100% Max	100
99%	100
95%	85
90%	80
75% Q3	75
50% Median	65
25% Q1	55
10%	50
5%	20
1%	10
0% Min	10

**Table 95:** Variable: Q6D3 (Percent of on time arrive: Rail to Portland)

Missing Values			
Missing Value	Count	-----Percent Of-----	
		All Obs	Missing Obs
.	133	62.74	89.86
D	3	1.42	2.03
M	12	5.66	8.11
Total	148	69.81	100.00

**Table 96:** Frequency Counts

Percents				Percents			
Value	Count	Cell	Cum	Value	Count	Cell	Cum
10	3	4.7	4.7	75	15	23.4	89.1
20	1	1.6	6.3	80	3	4.7	93.8
40	1	1.6	7.8	85	2	3.1	96.9
50	10	15.6	23.4	100	2	3.1	100.0

**Table 97:** Available : Truck to Railroad then Rail to Portland

Q6A4	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Missing	8			
Yes	108	52.94	108	52.94
No	96	47.06	204	100.00

**Table 98:** Transportation rate: Truck to Railroad

Q6B4T	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Don't Know	8			
Missing	11			
Skipped	97			
	1	2.08	2	2.08

1.33	7	7.29	9	9.38
1.6	3	3.13	12	12.50
1.66	11	11.46	23	23.96
1.99	2	2.08	25	26.04
2	5	5.21	30	31.25
2.33	4	4.17	34	35.42
2.66	3	3.13	37	38.54
2.99	1	1.04	38	39.58
3	14	14.58	52	54.17
3.2	2	2.08	54	56.25
3.33	4	4.17	58	60.42
3.35	1	1.04	59	61.46
3.66	5	5.21	64	66.67
4	3	3.13	67	69.79
4.35	1	1.04	68	70.83

**Table 98 (continued):** Transportation rate: Truck to Railroad

Q6B4T	Frequency	Percent	Cumulative Frequency	Cumulative Percent
4.58	1	1.04	69	71.88
4.99	1	1.04	70	72.92
5.2	1	1.04	71	73.96
5.33	2	2.08	73	76.04
5.66	2	2.08	75	78.13
6	2	2.08	77	80.21
6.66	2	2.08	79	82.29
7.6	1	1.04	80	83.33
8	3	3.13	83	86.46
8.5	1	1.04	84	87.50
8.66	1	1.04	85	88.54
10.66	3	3.13	88	91.67
11.66	6	6.25	94	97.92
12.33	1	1.04	95	98.96
25	1	1.04	96	100.00

**Table 99:** Variable: Q6B4T (Transportation rate: Truck to Railroad)

Moments			
N	96	Sum Weights	96
Mean	4.35895833	Sum Observations	418.46
Std Deviation	3.74064038	Variance	13.9923905
Skewness	2.46839113	Kurtosis	8.96740877
Uncorrected SS	3153.3268	Corrected SS	1329.2771
Coeff Variation	85.8150067	Std Error Mean	0.38177751

**Table 100:** Basic Statistical Measures

Location		Variability	
Mean	4.358958	Std Deviation	3.74064
Median	3.000000	Variance	13.99239
Mode	3.000000	Range	24.00000
		Interquartile Range	3.34000

**Table 101:** Quantiles (Definition 5)

Quantile	Estimate
100% Max	25.00
99%	25.00
95%	11.66
90%	10.66
75% Q3	5.33
50% Median	3.00
25% Q1	1.99
10%	1.60
5%	1.33
1%	1.00
0% Min	1.00

**Table 102:** Variable: Q6B4T (Transportation rate: Truck to Railroad)

Missing Values			
Missing Value	Count	Percent Of All Obs	Percent Of Missing Obs
.	97	45.75	83.62
D	8	3.77	6.90
M	11	5.19	9.48
Total	116	54.72	100.00

**Table 103:** Frequency Counts

Percents				Percents				Percents			
Value	Count	Cell	Cum	Value	Count	Cell	Cum	Value	Count	Cell	Cum
1	2	2.1	2.1	3	4	4.2	60.4	6	2	2.1	80.2
1	7	7.3	9.4	3	1	1.0	61.5	7	2	2.1	82.3
2	3	3.1	12.5	4	5	5.2	66.7	8	1	1.0	83.3
2	11	11.5	24.0	4	3	3.1	69.8	8	3	3.1	86.5
2	2	2.1	26.0	4	1	1.0	70.8	9	1	1.0	87.5
2	5	5.2	31.3	5	1	1.0	71.9	9	1	1.0	88.5
2	4	4.2	35.4	5	1	1.0	72.9	11	3	3.1	91.7
3	3	3.1	38.5	5	1	1.0	74.0	12	6	6.3	97.9
3	1	1.0	39.6	5	2	2.1	76.0	12	1	1.0	99.0
3	14	14.6	54.2	6	2	2.1	78.1	25	1	1.0	100.0
3	2	2.1	56.3								

**Table 104:** Transportation rate: Truck to Rail then Rail

Q6B4R	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Don't Know	8	.	.	.
Missing	13	.	.	.
Skipped	96	.	.	.
1.6	1	1.05	1	1.05
6.33	2	2.11	3	3.16
7.33	11	11.58	14	14.74
7.5	2	2.11	16	16.84
7.85	1	1.05	17	17.89
7.99	1	1.05	18	18.95
8	7	7.37	25	26.32
8.5	1	1.05	26	27.37
9.66	2	2.11	28	29.47
9.99	2	2.11	30	31.58
10	2	2.11	32	33.68
10.33	4	4.21	36	37.89
10.66	11	11.58	47	49.47
10.99	13	13.68	60	63.16
11	1	1.05	61	64.21
11.33	8	8.42	69	72.63
11.66	1	1.05	70	73.68
12	1	1.05	71	74.74
12.33	4	4.21	75	78.95

**Table 104 (continued):** Transportation rate: Truck to Rail then Rail

Q6B4R	Frequency	Percent	Cumulative Frequency	Cumulative Percent
12.66	2	2.11	77	81.05
13	2	2.11	79	83.16
13.33	7	7.37	86	90.53
13.66	5	5.26	91	95.79
13.99	3	3.16	94	98.95
32.45	1	1.05	95	100.00

**Table 105:** Variable: Q6B4R (Transportation rate: Truck to Rail then Rail)

Moments			
N	95	Sum Weights	95
Mean	10.6626316	Sum Observations	1012.95
Std Deviation	3.22218414	Variance	10.3824707
Skewness	2.9956735	Kurtosis	21.7364027
Uncorrected SS	11776.6649	Corrected SS	975.952242
Coeff Variation	30.219408	Std Error Mean	0.33058912

**Table 106:** Basic Statistical Measures

Location		Variability	
Mean	10.66263	Std Deviation	3.22218
Median	10.99000	Variance	10.38247
Mode	10.99000	Range	30.85000
		Interquartile Range	4.33000

**Table 107:** Quantiles (Definition 5)

Quantile	Estimate
100% Max	32.45
99%	32.45
95%	13.66
90%	13.33
75% Q3	12.33
50% Median	10.99
25% Q1	8.00
10%	7.33
5%	7.33
1%	1.60
0% Min	1.60

**Table 108:** Variable: Q6B4R (Transportation rate: Truck to Rail then Rail)

Missing Values

Missing Value	Count	-----Percent Of-----	
		All Obs	Missing Obs
.	96	45.28	82.05
D	8	3.77	6.84
M	13	6.13	11.11
Total	117	55.19	100.00

**Table 109:** Frequency Counts

Percents				Percents				Percents			
Value	Count	Cell	Cum	Value	Count	Cell	Cum	Value	Count	Cell	Cum
2	1	1.1	1.1	10	2	2.1	31.6	12	1	1.1	74.7
6	2	2.1	3.2	10	2	2.1	33.7	12	4	4.2	78.9
7	11	11.6	14.7	10	4	4.2	37.9	13	2	2.1	81.1
8	2	2.1	16.8	11	11	11.6	49.5	13	2	2.1	83.2
8	1	1.1	17.9	11	13	13.7	63.2	13	7	7.4	90.5
8	1	1.1	18.9	11	1	1.1	64.2	14	5	5.3	95.8
8	7	7.4	26.3	11	8	8.4	72.6	14	3	3.2	98.9
9	1	1.1	27.4	12	1	1.1	73.7	32	1	1.1	100.0
10	2	2.1	29.5								

**Table 110:** Average shipment time: Truck to Railroad then Rail to Portland

Q6C4	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Don't Know	4	.	.	.
Missing	14	.	.	.
Skipped	96	.	.	.
1	3	3.06	3	3.06
2	3	3.06	6	6.12
3	2	2.04	8	8.16
4	10	10.20	18	18.37
5	13	13.27	31	31.63
7	27	27.55	58	59.18
8	3	3.06	61	62.24
10	4	4.08	65	66.33
12	1	1.02	66	67.35
15	2	2.04	68	69.39
20	17	17.35	85	86.73



21	7	7.14	92	93.88
23	1	1.02	93	94.90
30	4	4.08	97	98.98
60	1	1.02	98	100.00

The average shipment time for the truck to railroad and then rail to Portland also had a substantial range, indicating that some of the locations had had bad experiences (Table 110). Over one fourth of the locations responding indicated that one week would be the average but 17 also felt 20 days was more typical in their experience. The average estimate was slightly over 11 days but with quite a large range, as indicated by the standard deviation of over nine days. This means 67% of the estimates fell into the broad range of 2.1 days to 20.4 days. The median and the most common was the seven day estimate (Table 113), though 20, 4 and 5 day estimates were also common.

Question 6 of the questionnaire also looked at reliability of this modal combination (Table 116). The most common estimate was 75% and 80% on time arrivals but the range was from zero to 100%. The average was 73% with a standard deviation of 23% and a median of 80% (Tables 118 and 119).

The last specific modal combination examined was barge direct to Portland (Table 123). Only 26 of the locations had this option which was dependent on being directly on the river. The rate for the barge to Portland ranged from \$3.22 to \$10.33 per ton. This is directly caused by the differing pools on the river and the different commodity or product being moved. The average rate was \$6.84 per ton with a fairly narrow standard deviation of \$1.49 per ton (Tables 124 and 125). The median rate was \$6.66 and even 75% were at or below \$7.75 (Table 126). Eleven of the twenty six locations offered rates around \$7 (Table 128).

The timeliness and reliability of straight barge to Portland was also investigated in the survey. By far the most common estimate for shipment time was 3 days to Portland, with 48% identifying this time, followed by two days, probably from locations further down the river, by 35% of the locations (Table 129). The average was 3 days, the median was also 3 and the standard deviation was only slightly over one day (Tables 130, 131 and 132). There were very few observations at the upper end of the estimates (Table 134).

A similar tight distribution, and very positive experience, was found when looking at the reliability as indicated by the percent on time arrival (Table 135). The lowest estimate was 75% and the highest was 100%. The most common estimate was 90% and the average was a similar 88% (Tables 136 and 137). Shippers were given the option of finding another unique combination that they had used at some time.

This option was used by 25 of the locations (Table 141) and just what the alternatives were are indicated in Table 142. The descriptive statistics are given in Tables 143 to 160. Due to the noticeable differences among the options chosen as "other", the transportation rate has a substantial variation, and a wide

**Table 111:** Variable: Q6C4 (Average shipment time: Truck to Railroad then Rail to Portland)

Moments			
N	98	Sum Weights	98
Mean	11.2755102	Sum Observations	1105
Std Deviation	9.18512986	Variance	84.3666106
Skewness	1.97339354	Kurtosis	6.8138315
Uncorrected SS	20643	Corrected SS	8183.56122
Coeff Variation	81.4608802	Std Error Mean	0.92783823

**Table 112:** Basic Statistical Measures

Location		Variability	
Mean	11.27551	Std Deviation	9.18513
Median	7.00000	Variance	84.36661
Mode	7.00000	Range	59.00000
		Interquartile Range	15.00000

**Table 113:** Quantiles (Definition 5)

Quantile	Estimate
100% Max	60
99%	60
95%	30
90%	21
75% Q3	20
50% Median	7
25% Q1	5
10%	4
5%	2
1%	1
0% Min	1

**Table 114:** Variable: Q6C4 (Average shipment time: Truck to Railroad then Rail to Portland)

Missing Values			
Missing Value	Count	-----Percent Of-----	
		All Obs	Missing Obs
.	96	45.28	84.21
D	4	1.89	3.51
M	14	6.60	12.28
Total	114	53.77	100.00

**Table 115:** Frequency Counts

Percents				Percents			
Value	Count	Cell	Cum	Value	Count	Cell	Cum
1	3	3.1	3.1	7	27	27.6	59.2
2	3	3.1	6.1	8	3	3.1	62.2
3	2	2.0	8.2	10	4	4.1	66.3
4	10	10.2	18.4	12	1	1.0	67.3
5	13	13.3	31.6	15	2	2.0	69.4
				60	1	1.0	100.0

**Table 116:** Percent of on time arrive: Truck to Rail then Rail to Portland

Q6D4	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Don't Know	5	.	.	.
Missing	12	.	.	.
Skipped	96	.	.	.
0	3	3.03	3	3.03
10	2	2.02	5	5.05
20	3	3.03	8	8.08
50	3	3.03	11	11.11
60	18	18.18	29	29.29
70	1	1.01	30	30.30

75	18	18.18	48	48.48
80	23	23.23	71	71.72
85	2	2.02	73	73.74
90	11	11.11	84	84.85
100	15	15.15	99	100.00

**Table 117:** Variable: Q6D4 (Percent of on time arrive: Truck to Rail then Rail to Portland)

Moments			
N	99	Sum Weights	99
Mean	73.030303	Sum Observations	7230
Std Deviation	23.1655332	Variance	536.641929
Skewness	-1.5362972	Kurtosis	2.59167097
Uncorrected SS	580600	Corrected SS	52590.9091
Coeff Variation	31.7204397	Std Error Mean	2.32822369

**Table 118:** Basic Statistical Measures

Location		Variability	
Mean	73.03030	Std Deviation	23.16553
Median	80.00000	Variance	536.64193
Mode	80.00000	Range	100.00000
		Interquartile Range	30.00000

**Table 119:** Quantiles (Definition 5)

Quantile	Estimate
100% Max	100
99%	100
95%	100
90%	100
75% Q3	90
50% Median	80
25% Q1	60
10%	50
5%	10
1%	0
0% Min	0

**Table 120:** Variable: Q6D4 (Percent of on time arrive: Truck to Rail then Rail to Portland)

Missing Values			
Missing Value	Count	----Percent Of----	Missing Obs
.	96	45.28	84.96
D	5	2.36	4.42
M	12	5.66	10.62
Total	113	53.30	100.00

**Table 121:** Frequency Counts

Percents				Percents			
Value	Count	Cell	Cum	Value	Count	Cell	Cum
0	3	3.0	3.0	60	18	18.2	29.3
10	2	2.0	5.1	70	1	1.0	30.3
20	3	3.0	8.1	75	18	18.2	48.5
50	3	3.0	11.1	80	23	23.2	71.7
				85	2	2.0	73.7
				90	11	11.1	84.8
				100	15	15.2	100.0

**Table 122:** Available : Barge to Portland

Q6A5	Frequency	Percent	Cumul ative Frequency	Cumul ative Percent
Missing	1	.	.	.

Yes	26	12.32	26	12.32
No	185	87.68	211	100.00

**Table 123:** Transportation rate: Barge to Portland

Q6B5B	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Don't Know	2	.	.	.
Missing	2	.	.	.
Skipped	185	.	.	.
3.22	1	4.35	1	4.35
4.66	1	4.35	2	8.70
4.75	2	8.70	4	17.39
6	1	4.35	5	21.74
6.54	2	8.70	7	30.43
6.66	5	21.74	12	52.17
7.33	2	8.70	14	60.87
7.41	2	8.70	16	69.57
7.55	1	4.35	17	73.91
7.75	1	4.35	18	78.26
7.99	3	13.04	21	91.30
8.4	1	4.35	22	95.65
10.33	1	4.35	23	100.00

**Table 124:** Variable: Q6B5B (Transportation rate: Barge to Portland)

Moments			
N	23	Sum Weights	23
Mean	6.83652174	Sum Observations	157.24
Std Deviation	1.48758073	Variance	2.21289644
Skewness	-0.3575117	Kurtosis	1.34276568
Uncorrected SS	1123.6584	Corrected SS	48.6837217
Coeff Variation	21.7593214	Std Error Mean	0.31018203

**Table 125:** Basic Statistical Measures

Location		Variability	
Mean	6.836522	Std Deviation	1.48758
Median	6.660000	Variance	2.21290
Mode	6.660000	Range	7.11000
		Interquartile Range	1.21000

**Table 126:** Quantiles (Definition 5)

Quantile	Estimate
100% Max	10.33
99%	10.33
95%	8.40
90%	7.99
75% Q3	7.75
50% Median	6.66
25% Q1	6.54
10%	4.75
5%	4.66
1%	3.22
0% Min	3.22

**Table 127:** Variable: Q6B5B (Transportation rate: Barge to Portland)  
Missing Values

Missing Value	Count	-----Percent Of-----	
		All Obs	Missing Obs
.	185	87.26	97.88
D	2	0.94	1.06
M	2	0.94	1.06
Total	189	89.15	100.00

**Table 128:** Frequency Counts

Percents				Percents			
Value	Count	Cell	Cum	Value	Count	Cell	Cum
3	1	4.3	4.3	7	5	21.7	52.2
5	1	4.3	8.7	7	2	8.7	60.9
5	2	8.7	17.4	7	2	8.7	69.6
6	1	4.3	21.7	8	1	4.3	73.9
7	2	8.7	30.4	8	1	4.3	78.3
				8	3	13.0	91.3
				8	1	4.3	95.7
				10	1	4.3	100.0

**Table 129:** Average shipment time: Barge to Portland

Q6C5	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Don't Know	1	.	.	.
Missing	3	.	.	.
Skipped	185	.	.	.
2	8	34.78	8	34.78
3	11	47.83	19	82.61
4	1	4.35	20	86.96
5	2	8.70	22	95.65
6	1	4.35	23	100.00

**Table 130:** Variable: Q6C5 (Average shipment time: Barge to Portland)

Moments			
N	23	Sum Weights	23
Mean	3	Sum Observations	69
Std Deviation	1.08711461	Variance	1.18181818

Skewness	1.39496195	Kurtosis	1.76111581
Uncorrected SS	233	Corrected SS	26
Coeff Variation	36.2371538	Std Error Mean	0.22667907

**Table 131:** Basic Statistical Measures

Location		Variability	
Mean	3.000000	Std Deviation	1.08711
Median	3.000000	Variance	1.18182
Mode	3.000000	Range	4.00000
		Interquartile Range	1.00000

**Table 132:** Quantiles (Definition 5)

Quantile	Estimate
100% Max	6
99%	6
95%	5
90%	5
75% Q3	3
50% Median	3
25% Q1	2
10%	2
5%	2
1%	2
0% Min	2

**Table 133:** Variable: Q6C5 (Average shipment time: Barge to Portland)

Missing Values			
Missing Value	Count	Percent of All Obs	Percent of Missing Obs
.	185	87.26	97.88
D	1	0.47	0.53
M	3	1.42	1.59
Total	189	89.15	100.00

**Table 134:** Frequency Counts

Percents				Percents			
Value	Count	Cell	Cum	Value	Count	Cell	Cum
2	8	34.8	34.8	4	1	4.3	87.0
3	11	47.8	82.6	5	2	8.7	95.7
				6	1	4.3	100.0

**Table 135:** Percent of on time arrive: Barge to Portland

Q6D5	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Don't Know	1	.	.	.
Missing	2	.	.	.
Skipped	185	.	.	.
75	6	25.00	6	25.00
80	2	8.33	8	33.33
90	9	37.50	17	70.83
95	1	4.17	18	75.00
99	1	4.17	19	79.17
100	5	20.83	24	100.00

**Table 136:** Variable: Q6D5 (Percent of on time arrive: Barge to Portland)

Moments			
N	24	Sum Weights	24
Mean	88.083333	Sum Observations	2114
Std Deviation	9.48186675	Variance	89.9057971
Skewness	-0.2413047	Kurtosis	-1.3269148
Uncorrected SS	188276	Corrected SS	2067.83333
Coeff Variation	10.7646548	Std Error Mean	1.93547795

**Table 137:** Basic Statistical Measures

Location		Variability	
Mean	88.08333	Std Deviation	9.48187
Median	90.00000	Variance	89.90580
Mode	90.00000	Range	25.00000
		Interquartile Range	19.50000

**Table 138:** Quantiles (Definition 5)

Quantile	Estimate
100% Max	100.0
99%	100.0
95%	100.0
90%	100.0
75% Q3	97.0
50% Median	90.0
25% Q1	77.5
10%	75.0
5%	75.0
1%	75.0
0% Min	75.0

**Table 139:** Variable: Q6D5 (Percent of on time arrive: Barge to Portland)

Missing Values			
Missing Value	Count	----Percent Of----	Missing Obs
.	185	87.26	98.40
D	1	0.47	0.53
M	2	0.94	1.06
Total	188	88.68	100.00

**Table 140:** Frequency Counts

Percents				Percents			
Value	Count	Cell	Cum	Value	Count	Cell	Cum
75	6	25.0	25.0	90	9	37.5	70.8
80	2	8.3	33.3	95	1	4.2	75.0
				100	5	20.8	100.0

**Table 141:** Available : Other

Q6A6	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Missing	2	.	.	.
Yes	25	11.90	25	11.90
No	185	88.10	210	100.00

**Table 142:** What other transportation

Q60T	Frequency	Percent	Cumulative Frequency	Cumulative Percent
185				
BARGE TO PASCO	1	3.70	1	3.70
DIRECT SHIP TO BRANCH LOCATION	1	3.70	2	7.41
DOMESTIC	1	3.70	3	11.11
FACILITY IN UPRAIL YARD -	1	3.70	4	14.81
M	2	7.41	6	22.22
NOTHING SPECIFIED	1	3.70	7	25.93
RAIL TO GULF	1	3.70	8	29.63
RAIL TO WALLULA	2	7.41	10	37.04
TRUCK	6	22.22	16	59.26
TRUCK TO DESTINATION	2	7.41	18	66.67
TRUCK TO FARMINGTON PLANT	1	3.70	19	70.37
TRUCK TO NYSSA, OR	1	3.70	20	74.07
TRUCK TO PORTLAND	4	14.81	24	88.89
TRUCK TO RITZVILLE	1	3.70	25	92.59
TRUCK TO SPOKANE	1	3.70	26	96.30
UPS	1	3.70	27	100.00

**Table 143:** Transportation rate: Other

Q6B6	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Don't Know	1	.	.	.
Missing	14	.	.	.
Skipped	185	.	.	.
2	1	8.33	1	8.33
2.5	1	8.33	2	16.67
3.75	1	8.33	3	25.00
6.38	1	8.33	4	33.33
6.66	1	8.33	5	41.67
8.33	1	8.33	6	50.00
10	1	8.33	7	58.33
14.66	1	8.33	8	66.67
15	1	8.33	9	75.00
24	1	8.33	10	83.33
26	1	8.33	11	91.67
31	1	8.33	12	100.00

**Table 144:** Variable: Q6B6 (Transportation rate: Other)

Moments			
N	12	Sum Weights	12
Mean	12.523333	Sum Observations	150.28
Std Deviation	9.76855096	Variance	95.4245879
Skewness	0.80996861	Kurtosis	-0.6039202
Uncorrected SS	2931.677	Corrected SS	1049.67047
Coeff Variation	78.0028025	Std Error Mean	2.81993776

**Table 145:** Basic Statistical Measures

Location		Variability	
Mean	12.52333	Std Deviation	9.76855
Median	9.16500	Variance	95.42459
Mode	.	Range	29.00000
		Interquartile Range	14.43500

**Table 146:** Quantiles (Definition 5)



Quantile	Estimate
100% Max	31.000
99%	31.000
95%	31.000
90%	26.000
75% Q3	19.500
50% Median	9.165
25% Q1	5.065
10%	2.500
5%	2.000
1%	2.000
0% Min	2.000

**Table 147:** Variable: Q6B6 (Transportation rate: Other)

Missing Values			
Missing Value	Count	Percent of All Obs	Percent of Missing Obs
.	185	87.26	92.50
D	1	0.47	0.50
M	14	6.60	7.00
Total	200	94.34	100.00

**Table 148:** Frequency Counts

Percents				Percents				Percents			
Value	Count	Cell	Cum	Value	Count	Cell	Cum	Value	Count	Cell	Cum
2	1	8.3	8.3	7	1	8.3	41.7	15	1	8.3	75.0
3	1	8.3	16.7	8	1	8.3	50.0	24	1	8.3	83.3
4	1	8.3	25.0	10	1	8.3	58.3	26	1	8.3	91.7
6	1	8.3	33.3	15	1	8.3	66.7	31	1	8.3	100.0

**Table 149:** Average shipment time: Other

Q6C6	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Missing	185	.	.	.
Skipped	185	.	.	.
1	6	31.58	6	31.58
2	3	15.79	9	47.37
3	3	15.79	12	63.16
4	2	10.53	14	73.68
6	1	5.26	15	78.95
7	1	5.26	16	84.21
10	1	5.26	17	89.47
11	1	5.26	18	94.74
20	1	5.26	19	100.00

**Table 150:** Variable: Q6C6 (Average shipment time: Other)

Moments			
N	19	Sum Weights	19
Mean	4.36842105	Sum Observations	83
Std Deviation	4.83287959	Variance	23.3567251
Skewness	2.21971919	Kurtosis	5.47172912
Uncorrected SS	783	Corrected SS	420.421053
Coeff Variation	110.632183	Std Error Mean	1.10873862

**Table 151:** Basic Statistical Measures

Location		Variability	
Mean	4.368421	Std Deviation	4.83288
Median	3.000000	Variance	23.35673
Mode	1.000000	Range	19.00000
		Interquartile Range	5.00000

**Table 152:** Quantiles (Definition 5)

Quantile	Estimate
100% Max	20
99%	20
95%	20
90%	11
75% Q3	6
50% Median	3
25% Q1	1
10%	1
5%	1
1%	1
0% Min	1

**Table 153:** Variable: Q6C6 (Average shipment time: Other)

Missing Values			
Missing Value	Count	Percent of All Obs	Percent of Missing Obs
.	185	87.26	95.85
M	8	3.77	4.15
Total	193	91.04	100.00

**Table 154:** Frequency Counts

Percents				Percents				Percents			
Value	Count	Cell	Cum	Value	Count	Cell	Cum	Value	Count	Cell	Cum
1	6	31.6	31.6	4	2	10.5	73.7	10	1	5.3	89.5
2	3	15.8	47.4	6	1	5.3	78.9	11	1	5.3	94.7
3	3	15.8	63.2	7	1	5.3	84.2	20	1	5.3	100.0

**Table 155:** Percent of on time arrive: Other

Q6D6	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Don't Know	1	.	.	.
Missing	8	.	.	.
Skipped	185	.	.	.
50	1	5.56	1	5.56
75	2	11.11	3	16.67
80	1	5.56	4	22.22
90	4	22.22	8	44.44
95	3	16.67	11	61.11
98	1	5.56	12	66.67
99	1	5.56	13	72.22
100	5	27.78	18	100.00

**Table 156:** Variable: Q6D6 (Percent of on time arrive: Other)

Moments			
N	18	Sum Weights	18
Mean	90.111111	Sum Observations	1622
Std. Deviation	12.9927079	Variance	168.810458
Skewness	-1.9940883	Kurtosis	4.51466691

Uncorrected SS	149030	Corrected SS	2869.77778
Coeff Variation	14.4185414	Std Error Mean	3.06241061

**Table 157:**

Basic Statistical Measures

Location		Variability	
Mean	90.1111	Std Deviation	12.99271
Median	95.0000	Variance	168.81046
Mode	100.0000	Range	50.00000
		Interquartile Range	10.00000

**Table 158:**

Quantiles (Definition 5)

Quantile	Estimate
100% Max	100
99%	100
95%	100
90%	100
75% Q3	100
50% Median	95
25% Q1	90
10%	75
5%	50
1%	50
0% Min	50

**Table 159:**

Variable: Q6D6 (Percent of on time arrive: Other)

Missing Values

Missing Value	Count	-----Percent Of-----	
		All Obs	Missing Obs
.	185	87.26	95.36
D	1	0.47	0.52
M	8	3.77	4.12
Total	194	91.51	100.00

**Table 160:**

Frequency Counts

Percents				Percents			
Value	Count	Cell	Cum	Value	Count	Cell	Cum
50	1	5.6	5.6	90	4	22.2	44.4
75	2	11.1	16.7	95	3	16.7	61.1
80	1	5.6	22.2	98	1	5.6	66.7
				99	1	5.6	72.2
				100	5	27.8	100.0

standard deviation. This also holds for the quality variables, on time delivery and average shipment times.

Specific attention was paid to the original mode used for the last shipment, with the information requested in question 7 in the survey (Table 161). The most common choice was truck to another location than Pasco and then barge to Portland, 33%. Pasco was the location for barge movements for only 7% of the locations. Barge, under any option, comprised 48% of the movements, slightly less than other grain movement estimates by the authors in other previous studies but probably reflecting the use of alternatives to barge by the non grain shippers. Rail to Portland, either feed by truck or already at the location, was used by 30% of the movements. Other, which included the alternatives specified in Table 142, was 22% of the movements.

When asked to specify the alternative that would be used if the first choice was not available for six months, 25% of the respondents felt that there were no alternatives available (Table 162). As would be for consistency, other alternatives were required about the same amount of the time. The truck and barge combination were the identified alternative for 32% of the locations, with rail being used about 18 percent of the time. It is noticeable that truck to Pasco and barge to Portland doubled in usage if the first alternative was not available. Truck to an alternative river port than Pasco decreased about 50% showing that this alternative, as indicated above, was the first desired alternative. Similarly, rail movements decreased about 50% as well.

### **Transportation Rate**

Individual shippers were asked if the transportation rate increased X percent (with the percentage varying across shippers in the sample), would they switch to the alternative at this location or continue with the original mode and destination. Shippers, over the array of percentage increases in each location's questionnaire, indicated a willingness to shift, since over two thirds of them replied they would shift to an alternative mode and destination. About 30% said that they would continue to use the original mode. Further evaluation of the average rate increase for the switchers versus those that stayed with the original option would be interesting. Shippers were then given the option, if they decided not to switch, to identify what percentage increase in the transportation rate would be necessary to cause them to switch to the alternative transportation mode (Table 164). There were only 27 locations in this category and the average was 54% (Tables 165 and 166). Forty percent of the locations required less than 50% to switch, with the median, meaning fifty percent above and fifty percent below, being 40% (Table 167). Again, further analysis could connect the willingness to shift to the percentages in each of

**Table 161:** Use for your very last freight shipment

Q7	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Missing	7	.	.	.
Truck to Pasco then Barge to Portland	15	7.32	15	7.32
Truck to xx then Barge to Portland	67	32.68	82	40.00
Rail to Portland	33	16.10	115	56.10
Truck to Railroad then Rail to Portland	28	13.66	143	69.76
Barge to Portland	17	8.29	160	78.05
Other (Specify mode and destination):	45	21.95	205	100.00

**Table 162:** Alternative transportation mode/destination

Q8	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Missing	11	.	.	.
Truck to Pasco then Barge to Portland	32	15.92	32	15.92
Truck to xx then Barge to Portland	33	16.42	65	32.34
Rail to Portland	14	6.97	79	39.30
Truck to Railroad then Rail to Portland	22	10.95	101	50.25
Other (Specify mode and destination):	49	24.38	150	74.63
No alternatives available	51	25.37	201	100.00

**Table 163:** If transportation rate increased XX%, would you switch to alternative

Q9	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Missing	14	.	.	.
Skipped	51	.	.	.
Switch to Alternative mode	104	70.75	104	70.75
Continue to use Original mode	43	29.25	147	100.00

**Table 164:** Percentage increase in the transportation rate needed to switch

Q9A	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Don't Know	4	.	.	.
Missing	26	.	.	.
Skipped	155	.	.	.
15	6	22.22	6	22.22
20	4	14.81	10	37.04
25	2	7.41	12	44.44
35	1	3.70	13	48.15
40	1	3.70	14	51.85
50	3	11.11	17	62.96
75	4	14.81	21	77.78
100	5	18.52	26	96.30
225	1	3.70	27	100.00

**Table 165:** Variable: Q9A (Percentage increase in the transportation rate needed to switch)

Moments			
N	27	Sum Weights	27
Mean	54.444444	Sum Observations	1470
Std Deviation	47.0746815	Variance	2216.02564
Skewness	1.94132903	Kurtosis	5.40561437
Uncorrected SS	137650	Corrected SS	57616.6667
Coeff Variation	86.4637008	Std Error Mean	9.05952668

**Table 166:** Basic Statistical Measures

Location		Variability	
Mean	54.44444	Std Deviation	47.07468
Median	40.00000	Variance	2216
Mode	15.00000	Range	210.00000

Interquartile Range 55.00000

**Table 167:** Quantiles (Definition 5)

Quantile	Estimate
100% Max	225
99%	225
95%	100
90%	100
75% Q3	75
50% Median	40
25% Q1	20
10%	15
5%	15
1%	15
0% Min	15

**Table 168:** Variable: Q9A (Percentage increase in the transportation rate needed to switch)

Missing Values

Missing Value	Count	-----Percent Of-----	
		All Obs	Missing Obs
.	155	73.11	83.78
D	4	1.89	2.16
M	26	12.26	14.05

**Table 169:** Frequency Counts

Percents				Percents				Percents			
Value	Count	Cell	Cum	Value	Count	Cell	Cum	Value	Count	Cell	Cum
15	6	22.2	22.2	35	1	3.7	48.1	75	4	14.8	77.8
20	4	14.8	37.0	40	1	3.7	51.9	100	5	18.5	96.3
25	2	7.4	44.4	50	3	11.1	63.0	225	1	3.7	100.0

the individual location's questionnaires. The two most common responses were 20% and 100% with an outlier of 225% from someone that was obviously reluctant to switch (Table 169).

### **Transit Time**

The effect of increased transit time, as an indicator of the importance of timeliness, was also examined. Shippers were asked if the transit time, defined here as including scheduling and waiting for equipment, for the original mode and destination were to increase X percent (again, varying the percentage over the questionnaires), would a switch to another alternative occur? Sixty five percent of the respondents indicated a sensitivity to transit time by indicating they would switch to another mode and destination (Table 170). Thirty five said they would continue to use the original mode. Further analysis about the average percentage change offered to the locations in the questionnaires, relative to switching or not, would be useful in the future.

For those that indicated that they would continue to use the original mode they were then asked what percentage decrease in the reliability would be necessary for them to switch to the alternative. The responses for the 51 locations ranged from 15% to 440% (Table 171). The average percentage increase was 91% (Tables 172 and 173), but it is obvious that this was affected by the outlier 440% response. The median was 50% and 75% were at or less than 15)% (Table 174). The two most common responses were 15% and 200% (Table 176), again indicating the wide range in willingness to switch in response to a decrease in transit time.

### **Reliability**

Similar analysis was done on the importance of reliability of the modes to the shippers who were asked if the percentage of time shipments arrived on-time of the original option decreased X percent (varied over the locations as usual), would the shipper switch to the alternative or stay with the original mode and destination. The same sensitivity was found as with transit time, about 62% of the shippers would switch and 38% would stay with the original mode (Table 177). For those that chose not to switch, they were asked what percentage decrease in reliability would be necessary to cause them to switch to the alternative. The range and distribution of responses are indicated in Table 178 and the descriptive statistics are presented in Tables 179 to 183. The most common response was 50%, the median was also 50 percent and the average was 65%, suggesting that a substantial change in reliability would have to occur for the shippers to change modes.

**Table 170:** If transit time increase xx%, would you switch to alternative

Q10	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Missing	15	.	.	.
Skipped	51	.	.	.
Switch to Alternative mode	95	65.07	95	65.07
Continue to use Original mode	51	34.93	146	100.00

**Table 171:** Percentage increase in the transit time needed to switch

Q10A	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Don't Know	3	.	.	.
Missing	32	.	.	.
Skipped	146	.	.	.
15	6	19.35	6	19.35
20	2	6.45	8	25.81
25	1	3.23	9	29.03
30	1	3.23	10	32.26
50	7	22.58	17	54.84
60	1	3.23	18	58.06
75	2	6.45	20	64.52
80	1	3.23	21	67.74
100	1	3.23	22	70.97
110	1	3.23	23	74.19
150	1	3.23	24	77.42
200	6	19.35	30	96.77
440	1	3.23	31	100.00

**Table 172:** Variable: Q10A (Percentage increase in the transit time needed to switch)

Moments			
N	31	Sum Weights	31
Mean	91.1290323	Sum Observations	2825
Std Deviation	93.6634906	Variance	8772.84946
Skewness	1.99492253	Kurtosis	5.12785513
Uncorrected SS	520625	Corrected SS	263185.484
Coeff Variation	102.781175	Std Error Mean	16.8224595

**Table 173:** Basic Statistical Measures

Location		Variability	
Mean	91.12903	Std Deviation	93.66349
Median	50.00000	Variance	8773
Mode	50.00000	Range	425.00000
		Interquartile Range	130.00000

**Table 174:** Quantiles (Definition 5)

Quantile	Estimate
100% Max	440
99%	440
95%	200
90%	200
75% Q3	150
50% Median	50
25% Q1	20
10%	15
5%	15
1%	15
0% Min	15



**Table 175:** Variable: Q10A (Percentage increase in the transit time needed to switch)

Missing Values			
Missing Value	Count	Percent Of All Obs	Percent Of Missing Obs
.	146	68.87	80.66
D	3	1.42	1.66
M	32	15.09	17.68
Total	181	85.38	100.00

**Table 176:** Frequency Counts

Percents				Percents				Percents			
Value	Count	Cell	Cum	Value	Count	Cell	Cum	Value	Count	Cell	Cum
15	6	19.4	19.4	60	1	3.2	58.1	110	1	3.2	74.2
20	2	6.5	25.8	75	2	6.5	64.5	150	1	3.2	77.4
25	1	3.2	29.0	80	1	3.2	67.7	200	6	19.4	96.8
30	1	3.2	32.3	100	1	3.2	71.0	440	1	3.2	100.0
50	7	22.6	54.8								

**Table 177:** If reliability decreased xx%, would you switch to alternative

Q11	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Missing	15	.	.	.
Skipped	51	.	.	.
Switch to Alternative mode	91	62.33	91	62.33
Continue to use Original mode	55	37.67	146	100.00

**Table 178:** Percentage decrease in the reliability needed to switch

Q11A	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Don't Know	3	.	.	.
Missing	29	.	.	.
Skipped	142	.	.	.
10	1	2.63	1	2.63
20	2	5.26	3	7.89
25	1	2.63	4	10.53
30	6	15.79	10	26.32
35	1	2.63	11	28.95
40	1	2.63	12	31.58
50	13	34.21	25	65.79
60	1	2.63	26	68.42
61	1	2.63	27	71.05
70	1	2.63	28	73.68
75	1	2.63	29	76.32
80	1	2.63	30	78.95
85	1	2.63	31	81.58
100	3	7.89	34	89.47
150	1	2.63	35	92.11
200	3	7.89	38	100.00

**Table 179:** Variable: Q11A (Percentage decrease in the reliability needed to switch)

Moments			
N	38	Sum Weights	38
Mean	64.7631579	Sum Observations	2461
Std. Deviation	48.4458094	Variance	2346.99644
Skewness	1.86711883	Kurtosis	3.03762692

Uncorrected SS	246221	Corrected SS	86838.8684
Coeff Variation	74.8045817	Std Error Mean	7.85894804

**Table 180:** Basic Statistical Measures

Location		Variability	
Mean	64.76316	Std Deviation	48.44581
Median	50.00000	Variance	2347
Mode	50.00000	Range	190.00000
		Interquartile Range	45.00000

**Table 181:** Quantiles (Definition 5)

Quantile	Estimate
100% Max	200
99%	200
95%	200
90%	150
75% Q3	75
50% Median	50
25% Q1	30
10%	25
5%	20
1%	10
0% Min	10

**Table 182:** Variable: Q11A (Percentage decrease in the reliability needed to switch)

Missing Values			
Missing Value	Count	-----Percent Of-----	
		All Obs	Missing Obs
.	142	66.98	81.61
D	3	1.42	1.72
M	29	13.68	16.67
Total	174	82.08	100.00

**Table 183:** Frequency Counts

Percents				Percents				Percents			
Value	Count	Cell	Cum	Value	Count	Cell	Cum	Value	Count	Cell	Cum
10	1	2.6	2.6	50	13	34.2	65.8	80	1	2.6	78.9
20	2	5.3	7.9	60	1	2.6	68.4	85	1	2.6	81.6
25	1	2.6	10.5	61	1	2.6	71.1	100	3	7.9	89.5
30	6	15.8	26.3	70	1	2.6	73.7	150	1	2.6	92.1
35	1	2.6	28.9	75	1	2.6	76.3	200	3	7.9	100.0
40	1	2.6	31.6								

### **Warehouse Characteristics**

The stability of the industry and the ability/timeliness of moving to new locations were investigated by determining the length of time each business had been at its current location. Some of the firms had been in business at that location for as little as two years while 12 of them indicated that they had been there for 95 years (Table 184). The distribution of years at that location had groupings around 25 years, 50 years, 65-75 years and around 95 years. The groupings around 25 years were probably firms located at the ports, since the Lower Granite Dam, opening up the river to slack water navigation was completed in 1975.

Those at the older years were grain elevators that had been developed early in the regions grain industry development. The average age being at that location was 46 years with a standard deviation of 26 years, indicating substantial variation in the industry (Tables 185 and 186) Twenty five percent of the firms had been at that location for 25 years with the median being 45 years (Table 187).

The importance of logistic costs in determining the current plant location was also queried. Over 57% felt that logistics costs were very important and another 19% felt they were somewhat important. Only 8% felt that logistics costs were not very important or were not important at all (Table 188). Firms were offered an alternative plant location that would result in lower logistical and transportation costs and asked what percentage of decrease in logistics and transportation costs would be necessary to relocate. Eighty four percent, 152 firms indicated that they would not relocate at all (Table 189). Of the 30 that indicated that they would relocate, the percentage decrease in logistics costs necessary to make that move ranged from 10% to 100% (Table 190). The average amount necessary to make the change was 36% and a standard deviation of 22% (Tables 191 and 192). Fifty percent of the firms would require a 25% or less decrease in logistics costs while 75% would require a decrease of 50% or less (Table 193). The most common percentage cited was 25, from about one third of the firms who had indicated that they would make a move (Table 195).

Specific information was sought as to what modes of transportation were commonly used for inbound and outbound shipments, with some indication of the frequency of use. Tables 196-199 indicate whether each of the modes were used at all by the firms for inbound shipments. Private truck was by far the most common, used by 89% of the firms for their inbound shipments. For-hire truck was also used by many of

the firms, 54% of them. As expected, barge was used by 2% of the firms for their inbound shipments, while rail was used by 15% of the firms as they collected their inbound shipments. Barge shipments were predominantly fertilizer and chemicals while rail had these and other miscellaneous inputs.

**Table 184:** Length elevator has been at current location

Q12	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Don't Know	18	.	.	.
Missing	5	.	.	.
2	2	1.06	2	1.06
3	2	1.06	4	2.12
4	3	1.59	7	3.70
5	4	2.12	11	5.82
6	2	1.06	13	6.88
7	4	2.12	17	8.99
8	4	2.12	21	11.11
9	1	0.53	22	11.64
10	2	1.06	24	12.70
14	2	1.06	26	13.76
15	1	0.53	27	14.29
18	2	1.06	29	15.34
19	2	1.06	31	16.40
20	3	1.59	34	17.99
23	1	0.53	35	18.52
24	4	2.12	39	20.63
25	10	5.29	49	25.93
29	1	0.53	50	26.46
30	14	7.41	64	33.86
32	2	1.06	66	34.92
34	1	0.53	67	35.45
35	3	1.59	70	37.04
36	1	0.53	71	37.57
38	3	1.59	74	39.15
40	8	4.23	82	43.39
41	1	0.53	83	43.92
42	2	1.06	85	44.97
44	1	0.53	86	45.50
45	11	5.82	97	51.32
46	2	1.06	99	52.38
47	3	1.59	102	53.97
48	3	1.59	105	55.56
50	10	5.29	115	60.85
51	1	0.53	116	61.38
52	1	0.53	117	61.90
55	2	1.06	119	62.96
60	14	7.41	133	70.37
62	1	0.53	134	70.90
63	1	0.53	135	71.43
64	1	0.53	136	71.96
65	3	1.59	139	73.54
67	11	5.82	150	79.37
69	3	1.59	153	80.95
70	7	3.70	160	84.66
71	1	0.53	161	85.19
75	10	5.29	171	90.48
77	1	0.53	172	91.01
80	1	0.53	173	91.53
85	1	0.53	174	92.06
88	1	0.53	175	92.59
94	1	0.53	176	93.12
95	12	6.35	188	99.47
100	1	0.53	189	100.00

**Table 185:** Variable: Q12 (Length elevator has been at current location)

Moments			
N	189	Sum Weights	189
Mean	46.0740741	Sum Observations	8708
Std Deviation	25.5785152	Variance	654.260441
Skewness	0.1327424	Kurtosis	-0.7590378
Uncorrected SS	524214	Corrected SS	123000.963
Coeff Variation	55.51607	Std Error Mean	1.86056321

**Table 186:** Basic Statistical Measures

Location		Variability	
Mean	46.07407	Std Deviation	25.57852
Median	45.00000	Variance	654.26044
Mode	30.00000	Range	98.00000
		Interquartile Range	42.00000

**Table 187:** Quantiles (Definition 5)

Quantile	Estimate
100% Max	100
99%	95
95%	95
90%	75
75% Q3	67
50% Median	45
25% Q1	25
10%	8
5%	5
1%	2
0% Min	2

**Table 188:** Variable: Q12 (Length elevator has been at current location)

Missing Values			
Missing Value	Count	-----Percent Of-----	
		All Obs	Missing Obs
D	18	8.49	78.26
M	5	2.36	21.74
Total	23	10.85	100.00

**Table 189:**

Frequency Counts				Percents				Percents			
Value	Count	Cell	Cum	Value	Count	Cell	Cum	Value	Count	Cell	Cum
2	2	1.1	1.1	30	14	7.4	33.9	60	14	7.4	70.4
3	2	1.1	2.1	32	2	1.1	34.9	62	1	0.5	70.9
4	3	1.6	3.7	34	1	0.5	35.4	63	1	0.5	71.4
5	4	2.1	5.8	35	3	1.6	37.0	64	1	0.5	72.0
6	2	1.1	6.9	36	1	0.5	37.6	65	3	1.6	73.5
7	4	2.1	9.0	38	3	1.6	39.2	67	11	5.8	79.4
8	4	2.1	11.1	40	8	4.2	43.4	69	3	1.6	81.0
9	1	0.5	11.6	41	1	0.5	43.9	70	7	3.7	84.7
10	2	1.1	12.7	42	2	1.1	45.0	71	1	0.5	85.2
14	2	1.1	13.8	44	1	0.5	45.5	75	10	5.3	90.5
15	1	0.5	14.3	45	11	5.8	51.3	77	1	0.5	91.0
18	2	1.1	15.3	46	2	1.1	52.4	80	1	0.5	91.5
19	2	1.1	16.4	47	3	1.6	54.0	85	1	0.5	92.1
20	3	1.6	18.0	48	3	1.6	55.6	88	1	0.5	92.6
23	1	0.5	18.5	50	10	5.3	60.8	94	1	0.5	93.1
24	4	2.1	20.6	51	1	0.5	61.4	95	12	6.3	99.5
25	10	5.3	25.9	52	1	0.5	61.9	100	1	0.5	100.0
29	1	0.5	26.5	55	2	1.1	63.0				

**Table 190:** Importance of logistic costs in determining plant location

	Q13	Frequency	Percent	Cumul ative Frequency	Cumul ative Percent
Missi ng		21			
Very i mportant		110	57.59	110	57.59
Somewhat i mportant		37	19.37	147	76.96
Not very i mportant		11	5.76	158	82.72
Not i mportant at all		5	2.62	163	85.34
Not appl icable		28	14.66	191	100.00

**Table 191:** Check here if you would not relocate.

	Q14CK	Frequency	Percent	Cumul ative Frequency	Cumul ative Percent
Missi ng		30			
Checked		152	83.52	152	83.52
Not checked		30	16.48	182	100.00

**Table 192:** Percentage decrease in logistics and transportation costs necessary to relocate

	Q14	Frequency	Percent	Cumul ative Frequency	Cumul ative Percent
Missi ng		30			
Ski pped		152			
10		2	6.67	2	6.67
20		6	20.00	8	26.67
25		9	30.00	17	56.67
35		2	6.67	19	63.33
40		2	6.67	21	70.00
50		4	13.33	25	83.33
60		2	6.67	27	90.00
75		1	3.33	28	93.33
80		1	3.33	29	96.67
100		1	3.33	30	100.00

**Table 193:** Variable: Q14 (Percentage decrease in logistics and transportation costs necessary to relocate)

Moments			
N	30	Sum Weights	30
Mean	36.333333	Sum Observations	1090
Std. Deviation	21.5731847	Variance	465.402299
Skewness	1.32542992	Kurtosis	1.4816221
Uncorrected SS	53100	Corrected SS	13496.6667
Coeff. Variation	59.3757378	Std. Error Mean	3.93870664

**Table 194:**

Basic Statistical Measures			
Location		Variability	
Mean	36.33333	Std. Deviation	21.57318
Median	25.00000	Variance	465.40230
Mode	25.00000	Range	90.00000
		Interquartile Range	30.00000

**Table 195:**

Quantiles (Definition 5)	
Quantile	Estimate
100% Max	100.0
99%	100.0
95%	80.0
90%	67.5
75% Q3	50.0
50% Median	25.0
25% Q1	20.0
10%	20.0
5%	10.0
1%	10.0
0% Min	10.0

**Table 196:** Variable: Q14 (Percentage decrease in logistics and transportation costs necessary to relocate)

Missing Values			
Missing Value	Count	-----Percent of----- All Obs	Missing Obs
.	152	71.70	83.52
M	30	14.15	16.48
Total	182	85.85	100.00

**Table 197:**

Frequency Counts				Percents				Percents			
Value	Count	Cell	Cum	Value	Count	Cell	Cum	Value	Count	Cell	Cum
10	2	6.7	6.7	40	2	6.7	70.0	75	1	3.3	93.3
20	6	20.0	26.7	50	4	13.3	83.3	80	1	3.3	96.7
25	9	30.0	56.7	60	2	6.7	90.0	100	1	3.3	100.0
35	2	6.7	63.3								

**Table 198:**

Is this mode used inbound: Private Truck				
Q151A	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Missing	5	.	.	.
Yes	180	86.96	180	86.96
No	27	13.04	207	100.00

**Table 199:**

Is this mode used inbound: For-Hire Truck				
Q151B	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Missing	5	.	.	.



Yes	110	53.14	110	53.14
No	97	46.86	207	100.00

**Table 200:** Is this mode used inbound: Barge

Q151C	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Missing	5	.	.	.
Yes	4	1.93	4	1.93
No	203	98.07	207	100.00

**Table 201:** Is this mode used inbound: Rail

Q151D	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Missing	5	.	.	.
Yes	31	14.98	31	14.98
No	176	85.02	207	100.00

When private truck is used, it is heavily used, with 90% and 100% being by far the most common answers (Table 200). For-hire truck was used most often for either 10% or 100 percent suggesting that for some of the firms the for-hire truck was only used to fill in when the need arose, while for others, the firm relied solely on the for-hire truck for their inbound shipments (Table 201). Barge, used only by four firms for inbound shipments was used for up to 16% but also as little as 2% (Table 202). Rail, when used for inbound shipments, varied greatly from 1% to 100%, with the variation being related to the product being moved (Table 203).

Some descriptive statistics on private truck are available in Tables 204-208. The average usage was 83 percent, with a median of 100%, again indicated the heavy dependence on private truck for inbound movements. Similar information on for-hire trucks is presented in Tables 209-213 where an average usage of 44% and a standard deviation of 41% are seen. Half of the firms use for-hire trucks for 25% or less of their movements inbound.

Barge, when used, is used for only about 10% of the inbound movements (Tables 214-218). The maximum is only 16% and the median was 10%. The estimates were spread fairly equally from 2% to 16%. Again, similar descriptive statistics for rail are presented in Tables 219-223. When rail is used for inbound movements it is used, on the average, for 27% of those shipments with the median being 10%, similar to barge. Seventy five percent of the shippers using rail for inbound shipments used it for 50% or less of those movements.

The same series of questions was focused on outbound shipments. Private truck was used by 131 or 64% of these firms for their outbound shipments to some degree or another (Table 224) For-hire truck was used by even more of the firms for outbound shipments, 168 or 82%. Barge was used by only 13% of the firms for shipments from that location. Actually, since there are rail-barge movements and truck-barge movements the number of firm reliant on barge is substantially higher. However this question asked specifically about shipments from that location for outbound shipments. Rail was used, as expected, more than barge, 38% (Table 227).

When private truck was used, it was commonly used for over 50% of the outbound movements (Table 228) and 16% of the firms relied on this mode of transportation for all of their movements. The most common usage was 50%, 80%, 90% and 100%. For-hire trucks were used either as a fill in to the private truck fleet when demand was high, or was used solely by the firm. For-hire truck was used by

**Table 202:** Percentage of shipments that come in this way: Private Truck

Q151 1	Frequency	Percent	Cumul ative Frequency	Cumul ative Percent
Missi ng	20	.	.	.
Ski pped	27	.	.	.
0	1	0.61	1	0.61
1	3	1.82	4	2.42
2	3	1.82	7	4.24
4	1	0.61	8	4.85
5	1	0.61	9	5.45
10	3	1.82	12	7.27
20	3	1.82	15	9.09
25	3	1.82	18	10.91
30	3	1.82	21	12.73
40	1	0.61	22	13.33
45	1	0.61	23	13.94
50	7	4.24	30	18.18
60	2	1.21	32	19.39
75	2	1.21	34	20.61
80	5	3.03	39	23.64
90	20	12.12	59	35.76
95	4	2.42	63	38.18
99	9	5.45	72	43.64
100	93	56.36	165	100.00

**Table 203:** Percentage of shipments that come in this way: For-Hire Truck

Q151 2	Frequency	Percent	Cumul ative Frequency	Cumul ative Percent
Missi ng	17	.	.	.
Ski pped	97	.	.	.
0	7	7.14	7	7.14
1	8	8.16	15	15.31
2	1	1.02	16	16.33
5	6	6.12	22	22.45
9	1	1.02	23	23.47
10	22	22.45	45	45.92
20	3	3.06	48	48.98
25	2	2.04	50	51.02
40	3	3.06	53	54.08
45	2	2.04	55	56.12
50	6	6.12	61	62.24
70	2	2.04	63	64.29
75	2	2.04	65	66.33
80	2	2.04	67	68.37
85	1	1.02	68	69.39
90	7	7.14	75	76.53
95	1	1.02	76	77.55
98	4	4.08	80	81.63
99	2	2.04	82	83.67
100	16	16.33	98	100.00

**Table 204:** Percentage of shipments that come in this way: Barge

Q151 3	Frequency	Percent	Cumul ative Frequency	Cumul ative Percent
Missi ng	5	.	.	.
Ski pped	203	.	.	.
2	1	25.00	1	25.00
5	1	25.00	2	50.00
15	1	25.00	3	75.00
16	1	25.00	4	100.00

**Table 205:** Percentage of shipments that come in this way: Rail

Q151 4	Frequency	Percent	Cumul ative Frequency	Cumul ative Percent
		73		

```

ffffff
Mi ssi ng      6
Ski pped      176
0              1      3.33      1      3.33
1              4      13.33     5      16.67
2              3      10.00     8      26.67
3              1      3.33     9      30.00
5              2      6.67     11     36.67
6              1      3.33     12     40.00
10             8      26.67     20     66.67
13             1      3.33     21     70.00
20             1      3.33     22     73.33
50             1      3.33     23     76.67
70             2      6.67     25     83.33
85             1      3.33     26     86.67
94             1      3.33     27     90.00
95             1      3.33     28     93.33
99             1      3.33     29     96.67
100            1      3.33     30    100.00

```

**Table 206:** Variable: Q1511 (Percentage of shipments that come in this way: Private Truck)

Moments

N	165	Sum Weights	165
Mean	83.3272727	Sum Observations	13749
Std. Deviation	30.0759534	Variance	904.562971
Skewness	-1.7665948	Kurtosis	1.66904796
Uncorrected SS	1294015	Corrected SS	148348.327
Coeff. Variation	36.093769	Std. Error Mean	2.34140979

**Table 207:** Basic Statistical Measures

Location		Variability	
Mean	83.3273	Std. Deviation	30.07595
Median	100.0000	Variance	904.56297
Mode	100.0000	Range	100.00000
		Interquartile Range	10.00000

**Table 208:** Quantiles (Definition 5)

Quantile	Estimate
100% Max	100
99%	100
95%	100
90%	100
75% Q3	100
50% Median	100
25% Q1	90
10%	25
5%	5
1%	1
0% Min	0

**Table 209:** Variable: Q1511 (Percentage of shipments that come in this way: Private Truck)

Missing Values

Missing Value	Count	-----Percent Of-----	
		All Obs	Missing Obs
.	27	12.74	57.45
M	20	9.43	42.55
Total	47	22.17	100.00

**Table 210:** Frequency Counts

Percents				Percents				Percents			
Value	Count	Cell	Cum	Value	Count	Cell	Cum	Value	Count	Cell	Cum
0	1	0.6	0.6	25	3	1.8	10.9	75	2	1.2	20.6
1	3	1.8	2.4	30	3	1.8	12.7	80	5	3.0	23.6
2	3	1.8	4.2	40	1	0.6	13.3	90	20	12.1	35.8
4	1	0.6	4.8	45	1	0.6	13.9	95	4	2.4	38.2

5	1	0.6	5.5	50	7	4.2	18.2	99	9	5.5	43.6
10	3	1.8	7.3	60	2	1.2	19.4	100	93	56.4	100.0
20	3	1.8	9.1								

**Table 211:** Variable: Q1512 (Percentage of shipments that come in this way: For-Hire Truck)

Moments			
N	98	Sum Weights	98
Mean	44.2755102	Sum Observations	4339
Std Deviation	40.7974076	Variance	1664.42847
Skewness	0.3232946	Kurtosis	-1.6814136
Uncorrected SS	353561	Corrected SS	161449.561
Coeff Variation	92.1444099	Std Error Mean	4.12116051

**Table 212:** Basic Statistical Measures

Location		Variability	
Mean	44.27551	Std Deviation	40.79741
Median	25.00000	Variance	1664
Mode	10.00000	Range	100.00000
		Interquartile Range	80.00000

**Table 213:** Quantiles (Definition 5)

Quantile	Estimate
100% Max	100
99%	100
95%	100
90%	100
75% Q3	90
50% Median	25
25% Q1	10
10%	1
5%	0
1%	0
0% Min	0

**Table 214:** Variable: Q1512 (Percentage of shipments that come in this way: For-Hire Truck)

Missing Values			
Missing Value	Count	-----Percent of----- All Obs	Missing Obs
.	97	45.75	85.09
M	17	8.02	14.91
Total	114	53.77	100.00

**Table 215:** Frequency Counts

Percents				Percents			
Value	Count	Cell	Cum	Value	Count	Cell	Cum
0	7	7.1	7.1	25	2	2.0	51.0
1	8	8.2	15.3	40	3	3.1	54.1
2	1	1.0	16.3	45	2	2.0	56.1
5	6	6.1	22.4	50	6	6.1	62.2
9	1	1.0	23.5	70	2	2.0	64.3
10	22	22.4	45.9	75	2	2.0	66.3
20	3	3.1	49.0	80	2	2.0	68.4
				85	1	1.0	69.4
				90	7	7.1	76.5
				95	1	1.0	77.6
				98	4	4.1	81.6
				99	2	2.0	83.7
				100	16	16.3	100.0



**Table 216:** Variable: Q1513 (Percentage of shipments that come in this way: Barge)

Moments			
N	4	Sum Weights	4
Mean	9.5	Sum Observations	38
Std Deviation	7.04745817	Variance	49.6666667
Skewness	-0.1371335	Kurtosis	-5.0216657
Uncorrected SS	510	Corrected SS	149
Coeff Variation	74.1837702	Std Error Mean	3.52372909

**Table 217:** Basic Statistical Measures

Location		Variability	
Mean	9.50000	Std Deviation	7.04746
Median	10.00000	Variance	49.66667
Mode	.	Range	14.00000
		Interquartile Range	12.00000

**Table 218:** Quantiles (Definition 5)

Quantile	Estimate
100% Max	16.0
99%	16.0
95%	16.0
90%	16.0
75% Q3	15.5
50% Median	10.0
25% Q1	3.5
10%	2.0
5%	2.0
1%	2.0
0% Min	2.0

**Table 219:** Variable: Q1513 (Percentage of shipments that come in this way: Barge)

Missing Values			
Missing Value	Count	-----Percent Of-----	
		All Obs	Missing Obs
.	203	95.75	97.60
M	5	2.36	2.40
Total	208	98.11	100.00

**Table 220:** Frequency Counts

Percents				Percents			
Value	Count	Cell	Cum	Value	Count	Cell	Cum
2	1	25.0	25.0	15	1	25.0	75.0
5	1	25.0	50.0	16	1	25.0	100.0

**Table 221:** Variable: Q1514 (Percentage of shipments that come in this way: Rail)

Moments			
N	30	Sum Weights	30
Mean	26.833333	Sum Observations	805
Std Deviation	35.7511353	Variance	1278.14368
Skewness	1.24404526	Kurtosis	-0.1826209
Uncorrected SS	58667	Corrected SS	37066.1667
Coeff Variation	133.234045	Std Error Mean	6.52723443

**Table 222:** Basic Statistical Measures

Location		Variability	
Mean	26.83333	Std Deviation	35.75114
Median	10.00000	Variance	1278
Mode	10.00000	Range	100.00000
		Interquartile Range	48.00000

**Table 223:** Quantiles (Definition 5)

Quantile	Estimate
100% Max	100.0
99%	100.0
95%	99.0
90%	94.5
75% Q3	50.0
50% Median	10.0
25% Q1	2.0
10%	1.0
5%	1.0
1%	0.0
0% Min	0.0

**Table 224:** Variable: Q1514 (Percentage of shipments that come in this way: Rail)

Missing Values			
Missing Value	Count	----Percent Of----	Missing Obs
.	176	83.02	96.70
M	6	2.83	3.30
Total	182	85.85	100.00

**Table 225:** Frequency Counts

Percents				Percents				Percents			
Value	Count	Cell	Cum	Value	Count	Cell	Cum	Value	Count	Cell	Cum
0	1	3.3	3.3	10	8	26.7	66.7	85	1	3.3	86.7
1	4	13.3	16.7	13	1	3.3	70.0	94	1	3.3	90.0
2	3	10.0	26.7	20	1	3.3	73.3	95	1	3.3	93.3
3	1	3.3	30.0	50	1	3.3	76.7	99	1	3.3	96.7
5	2	6.7	36.7	70	2	6.7	83.3	100	1	3.3	100.0
6	1	3.3	40.0								

**Table 226:** Is this mode used outbound: Private Truck

	Q150A	Frequency	Percent	Cumulative Frequency	Cumulative Percent
<i>Columbia/Snake River Transportation Study</i>			78		
					<i>Casavant and Jessup May 2005</i>



ff				
Missing	6			
Yes	131	63.59	131	63.59
No	75	36.41	206	100.00

**Table 227:** Is this mode used outbound: For-Hire Truck

	Q150B	Frequency	Percent	Cumulative Frequency	Cumulative Percent
ff					
Missing		6			
Yes		168	81.55	168	81.55
No		38	18.45	206	100.00

**Table 228:** Is this mode used outbound: Barge

	Q150C	Frequency	Percent	Cumulative Frequency	Cumulative Percent
ff					
Missing		6			
Yes		27	13.11	27	13.11
No		179	86.89	206	100.00

**Table 229:** Is this mode used outbound: Rail

	Q150D	Frequency	Percent	Cumulative Frequency	Cumulative Percent
ff					
Missing		6			
Yes		77	37.38	77	37.38
No		129	62.62	206	100.00

19% of the firms for 100% of their outbound movements. It was also common to use it for 10%, 20% 50% and 80% of their movements (Table 229). Tables 230 and 231 indicate that 30% of those using barge for outbound shipments use it almost exclusively while rail shipments vary, but with 17% still relying on rail for 90% of their outbound movements. The variation in rail reflects the differing rail rates that are available and the competitive situation surrounding the firms at those locations.

When private truck is used, as indicated earlier, it is used quite heavily. The average usage was 55% with a median of 50% (Tables 232-236). Over 50% used private truck for 80% or more of their shipments. For-hire trucks, Tables 237-241, are used slightly less, 49%, than private trucks but have a similar median for their distribution of responses. For-hire truck usage was very common at 5%, 10%, 20%, 50% and 100%. Nineteen percent of the firms used for-hire trucking for 100% of their outbound shipments.

Barge and rail movements, if used, were heavily used, 85% and 43%, respectively (Tables 242-251). The median for barge was 99% and for rail it was only 30%, again revealing the heavier dependence,

when used, on barges and more flexibility on rail. This is expected since those firms located on the river did so to make use of the barge efficiencies and they are doing so. Firms using rail usually have other options available, as presented earlier in this report, and the wide range in usage supports this statement.

The capacity of the locations to load many rail road cars at one time was of interest because it often determines the rail rate that can be accessed and the ability to respond to large “buys” in the market. Over 57% of the firms indicated that they did not have the capability to load or unload rail cars at their site (Table 252). Of those that indicated that they could load or unload at the site, 23% indicated their capacity was around the 25-26 car load level, suggesting these facilities had developed this capacity in response to and desire to access the 25-26 car rail rates. The other common size was at 3 cars, which also has a rate of its own (Table 253). The average for the respondents to the question was 19, but as indicated above, was distributed heavily on the 3 and 26 car capacity (Tables 254 and 255). Seventy five percent of the firms had 26 cars or less capacity to load or unload at that facility.

Information was sought as to the value of the commodity being shipped. The question (#17) asked for the past three years what the average price in the county was before it was shipped. The responses are offered in Table 259 in price per ton. There are two distinct groups, one relating to the grain product and another relating to the fertilizer, chemicals, and assorted products which are significantly higher value. The average price was \$28 but the standard deviation, reflecting the two distinct groups, was \$106.

**Table 230:** Percentage of shipments that go out this way: Private Truck

Q1501	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Mississippi	12	.	.	.
0	2	1.60	2	1.60
1	5	4.00	7	5.60
2	3	2.40	10	8.00
4	1	0.80	11	8.80
5	12	9.60	23	18.40
10	8	6.40	31	24.80
15	1	0.80	32	25.60
20	7	5.60	39	31.20
25	3	2.40	42	33.60
30	1	0.80	43	34.40
33	1	0.80	44	35.20
34	1	0.80	45	36.00
35	1	0.80	46	36.80
40	1	0.80	47	37.60
49	1	0.80	48	38.40
50	16	12.80	64	51.20
60	2	1.60	66	52.80
70	1	0.80	67	53.60
75	1	0.80	68	54.40
80	16	12.80	84	67.20
85	2	1.60	86	68.80
90	13	10.40	99	79.20
95	6	4.80	105	84.00
100	20	16.00	125	100.00

**Table 231:** Percentage of shipments that go out this way: For-Hire Truck

Q1502	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Mississippi	13	.	.	.
0	1	0.62	1	0.62
1	8	4.97	9	5.59
3	2	1.24	11	6.83
5	18	11.18	29	18.01
10	21	13.04	50	31.06
15	1	0.62	51	31.68
20	20	12.42	71	44.10
25	2	1.24	73	45.34
30	2	1.24	75	46.58
34	1	0.62	76	47.20
35	1	0.62	77	47.83
40	2	1.24	79	49.07
49	2	1.24	81	50.31
50	12	7.45	93	57.76
60	2	1.24	95	59.01
65	1	0.62	96	59.63
66	1	0.62	97	60.25
70	2	1.24	99	61.49
75	5	3.11	104	64.60
80	9	5.59	113	70.19
85	2	1.24	115	71.43
89	1	0.62	116	72.05

**Table 231 (continued):** Percentage of shipments that go out this way: For-Hire Truck

Q1502	Frequency	Percent	Cumulative Frequency	Cumulative Percent
90	9	5.59	125	77.64
93	1	0.62	126	78.26
95	1	0.62	127	78.88
98	2	1.24	129	80.12
99	1	0.62	130	80.75
100	31	19.25	161	100.00

**Table 232:** Percentage of shipments that go out this way: Barge

Q1503	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Mississippi	9	.	.	.
0	1	4.17	1	4.17
10	1	4.17	2	8.33
25	1	4.17	3	12.50

45	1	4.17	4	16.67
88	1	4.17	5	20.83
90	2	8.33	7	29.17
94	1	4.17	8	33.33
97	1	4.17	9	37.50
98	1	4.17	10	41.67
99	7	29.17	17	70.83
100	7	29.17	24	100.00

**Table 233:** Percentage of shipments that go out this way: Rail

Q1504	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Missing	13	.	.	.
Skipped	129	.	.	.
0	3	4.29	3	4.29
1	2	2.86	5	7.14
2	2	2.86	7	10.00
5	4	5.71	11	15.71
10	12	17.14	23	32.86
11	1	1.43	24	34.29
15	4	5.71	28	40.00
20	1	1.43	29	41.43
25	1	1.43	30	42.86
30	6	8.57	36	51.43
33	1	1.43	37	52.86
35	2	2.86	39	55.71
40	1	1.43	40	57.14
45	1	1.43	41	58.57
50	2	2.86	43	61.43
60	3	4.29	46	65.71
70	2	2.86	48	68.57
80	7	10.00	55	78.57
90	12	17.14	67	95.71
96	1	1.43	68	97.14
100	2	2.86	70	100.00

**Table 234:** Variable: Q1501 (Percentage of shipments that go out this way: Private Truck)

		Moments	
N	125	Sum Weights	125
Mean	54.888	Sum Observations	6861
Std Deviation	37.2266848	Variance	1385.82606
Skewness	-0.2041953	Kurtosis	-1.5756181
Uncorrected SS	548429	Corrected SS	171842.432
Coeff Variation	67.8229938	Std Error Mean	3.32965592

**Table 235:** Basic Statistical Measures

Location		Variability	
Mean	54.8880	Std Deviation	37.22668
Median	50.0000	Variance	1386
Mode	100.0000	Range	100.00000
		Interquartile Range	75.00000

**Table 236:** Quantiles (Definition 5)

Quantile	Estimate
100% Max	100
99%	100
95%	100
90%	100
75% Q3	90
50% Median	50
25% Q1	15
10%	5
5%	1
1%	0
0% Min	0

**Table 237:** Variable: Q1501 (Percentage of shipments that go out this way: Private Truck)

Missing Values			
Missing Value	Count	Percent of All Obs	Percent of Missing Obs
.	75	35.38	86.21
M	12	5.66	13.79
Total	87	41.04	100.00

**Table 238:**

Percents				Frequency Counts				Percents			
Value	Count	Cell	Cum	Value	Count	Cell	Cum	Value	Count	Cell	Cum
0	2	1.6	1.6	25	3	2.4	33.6	60	2	1.6	52.8
1	5	4.0	5.6	30	1	0.8	34.4	70	1	0.8	53.6
2	3	2.4	8.0	33	1	0.8	35.2	75	1	0.8	54.4
4	1	0.8	8.8	34	1	0.8	36.0	80	16	12.8	67.2
5	12	9.6	18.4	35	1	0.8	36.8	85	2	1.6	68.8
10	8	6.4	24.8	40	1	0.8	37.6	90	13	10.4	79.2
15	1	0.8	25.6	49	1	0.8	38.4	95	6	4.8	84.0
20	7	5.6	31.2	50	16	12.8	51.2	100	20	16.0	100.0

**Table 239:** Variable: Q1502 (Percentage of shipments that go out this way: For-Hire Truck)

Moments			
N	161	Sum Weights	161
Mean	48.5962733	Sum Observations	7824
Std Deviation	38.5094759	Variance	1482.97974
Skewness	0.17222102	Kurtosis	-1.6695703
Uncorrected SS	617494	Corrected SS	237276.758
Coeff Variation	79.2436813	Std Error Mean	3.03497187

**Table 240:** Basic Statistical Measures

Location		Variability	
Mean	48.5963	Std Deviation	38.50948
Median	49.0000	Variance	1483
Mode	100.0000	Range	100.00000
		Interquartile Range	80.00000

**Table 241:** Quantiles (Definition 5)

Quantile	Estimate
100% Max	100
99%	100
95%	100
90%	100
75% Q3	90
50% Median	49
25% Q1	10
10%	5
5%	1
1%	1
0% Min	0

**Table 242:** Variable: Q1502 (Percentage of shipments that go out this way: For-Hire Truck)

Missing Values			
Missing Value	Count	-----Percent All Obs	OF----- Missing Obs
.	38	17.92	74.51
M	13	6.13	25.49
Total	51	24.06	100.00

**Table 243:** Frequency Counts

Percents				Percents				Percents			
Value	Count	Cell	Cum	Value	Count	Cell	Cum	Value	Count	Cell	Cum
0	1	0.6	0.6	35	1	0.6	47.8	80	9	5.6	70.2
1	8	5.0	5.6	40	2	1.2	49.1	85	2	1.2	71.4
3	2	1.2	6.8	49	2	1.2	50.3	89	1	0.6	72.0
5	18	11.2	18.0	50	12	7.5	57.8	90	9	5.6	77.6
10	21	13.0	31.1	60	2	1.2	59.0	93	1	0.6	78.3
15	1	0.6	31.7	65	1	0.6	59.6	95	1	0.6	78.9
20	20	12.4	44.1	66	1	0.6	60.2	98	2	1.2	80.1
25	2	1.2	45.3	70	2	1.2	61.5	99	1	0.6	80.7
30	2	1.2	46.6	75	5	3.1	64.6	100	31	19.3	100.0
34	1	0.6	47.2								

**Table 244:** Variable: Q1503 (Percentage of shipments that go out this way: Barge)

Moments			
N	24	Sum Weights	24
Mean	84.583333	Sum Observations	2030
Std Deviation	30.5356764	Variance	932.427536
Skewness	-2.0680416	Kurtosis	2.92640105
Uncorrected SS	193150	Corrected SS	21445.8333
Coeff Variation	36.1012924	Std Error Mean	6.23306885

**Table 245:** Basic Statistical Measures

Location		Variability	
Mean	84.58333	Std Deviation	30.53568
Median	99.00000	Variance	932.42754
Mode	99.00000	Range	100.00000
		Interquartile Range	10.00000

**Table 246:** Quantiles (Definition 5)

Quantile	Estimate
100% Max	100
99%	100
95%	100
90%	100
75% Q3	100
50% Median	99
25% Q1	90
10%	25
5%	10
1%	0
0% Min	0

**Table 247:** Variable: Q1503 (Percentage of shipments that go out this way: Barge)

Missing Values			
Missing Value	Count	All Obs	Percent of Missing Obs
.	179	84.43	95.21
M	9	4.25	4.79
Total	188	88.68	100.00

**Table 248:** Frequency Counts

Percents				Percents				Percents			
Value	Count	Cell	Cum	Value	Count	Cell	Cum	Value	Count	Cell	Cum
0	1	4.2	4.2	88	1	4.2	20.8	98	1	4.2	41.7
10	1	4.2	8.3	90	2	8.3	29.2	99	7	29.2	70.8
25	1	4.2	12.5	94	1	4.2	33.3	100	7	29.2	100.0
45	1	4.2	16.7	97	1	4.2	37.5				

**Table 249:** Variable: Q1504 (Percentage of shipments that go out this way: Rail)

Moments			
N	70	Sum Weights	70
Mean	42.6571429	Sum Observations	2986
Std Deviation	35.1728179	Variance	1237.12712
Skewness	0.31996971	Kurtosis	-1.5648435
Uncorrected SS	212736	Corrected SS	85361.7714
Coeff Variation	82.4546971	Std Error Mean	4.20395583

**Table 250:** Basic Statistical Measures

Location		Variability	
Mean	42.65714	Std Deviation	35.17282
Median	30.00000	Variance	1237
Mode	10.00000	Range	100.00000
		Interquartile Range	70.00000

**Table 251:** Quantiles (Definition 5)

Quantile	Estimate
100% Max	100.0
99%	100.0
95%	90.0
90%	90.0
75% Q3	80.0
50% Median	30.0
25% Q1	10.0
10%	3.5
5%	1.0
1%	0.0
0% Min	0.0

**Table 252:** Variable: Q1504 (Percentage of shipments that go out this way: Rail)

Missing Values			
Missing Value	Count	----Percent Of----	Missing Obs
.	129	60.85	90.85
M	13	6.13	9.15
Total	142	66.98	100.00

**Table 253:** Frequency Counts

Percents				Percents			
Value	Count	Cell	Cum	Value	Count	Cell	Cum
0	3	4.3	4.3	20	1	1.4	41.4
1	2	2.9	7.1	25	1	1.4	42.9
2	2	2.9	10.0	30	6	8.6	51.4
5	4	5.7	15.7	33	1	1.4	52.9
10	12	17.1	32.9	35	2	2.9	55.7
11	1	1.4	34.3	40	1	1.4	57.1
15	4	5.7	40.0	45	1	1.4	58.6
				50	2	2.9	61.4
				60	3	4.3	65.7
				70	2	2.9	68.6
				80	7	10.0	78.6
				90	12	17.1	95.7
				96	1	1.4	97.1
				100	2	2.9	100.0

**Table 254:** Check here if you cannot load or unload rail cars at this facility

Q16CK	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Missing	4	.	.	.
Checked	119	57.21	119	57.21
Not checked	89	42.79	208	100.00

**Table 255:** How many rail cars can be loaded or unload at your facility

Q16	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Missing	5	.	.	.
Skipped	119			
1	6	6.82	6	6.82
2	6	6.82	12	13.64
3	10	11.36	22	25.00
4	6	6.82	28	31.82
5	8	9.09	36	40.91
6	6	6.82	42	47.73
7	2	2.27	44	50.00
8	2	2.27	46	52.27
9	1	1.14	47	53.41
10	3	3.41	50	56.82
12	2	2.27	52	59.09
18	1	1.14	53	60.23
25	5	5.68	58	65.91
26	15	17.05	73	82.95
27	7	7.95	80	90.91
30	2	2.27	82	93.18



40	1	1.14	83	94.32
52	1	1.14	84	95.45

**Table 255 (continued):** How many rail cars can be loaded or unload at your facility

Q16	Frequency	Percent	Cumulative Frequency	Cumulative Percent
75	1	1.14	85	96.59
110	1	1.14	86	97.73
150	1	1.14	87	98.86
275	1	1.14	88	100.00

**Table 256:** Variable: Q16 (How many rail cars can be loaded or unload at your facility)

Moments

N	88	Sum Weights	88
Mean	19.6022727	Sum Observations	1725
Std Deviation	35.2917364	Variance	1245.50666
Skewness	5.25666301	Kurtosis	33.6055089
Uncorrected SS	142173	Corrected SS	108359.08
Coeff Variation	180.039003	Std Error Mean	3.76211175

**Table 257:** Basic Statistical Measures

Location		Variability	
Mean	19.60227	Std Deviation	35.29174
Median	7.50000	Variance	1246
Mode	26.00000	Range	274.00000
		Interquartile Range	22.50000

**Table 258:** Quantiles (Definition 5)

Quantile	Estimate
100% Max	275.0
99%	275.0
95%	52.0
90%	27.0
75% Q3	26.0
50% Median	7.5
25% Q1	3.5
10%	2.0
5%	1.0
1%	1.0
0% Min	1.0

**Table 259:** Variable: Q16 (How many rail cars can be loaded or unload at your facility)

Missing Values

Missing Value	Count	----Percent All Obs	OF----- Missing Obs
.	119	56.13	95.97
M	5	2.36	4.03
Total	124	58.49	100.00

**Table 260:** Frequency Counts

Percents				Percents			
Value	Count	Cell	Cum	Value	Count	Cell	Cum
1	6	6.8	6.8	9	1	1.1	53.4
2	6	6.8	13.6	10	3	3.4	56.8
3	10	11.4	25.0	12	2	2.3	59.1
4	6	6.8	31.8	18	1	1.1	60.2
5	8	9.1	40.9	25	5	5.7	65.9
6	6	6.8	47.7	26	15	17.0	83.0
7	2	2.3	50.0	27	7	8.0	90.9
8	2	2.3	52.3				

**Table 261:** What was the average commodity price over the last three years

Cumulative      Cumulative

Q17	Frequency	Percent	Frequency	Percent
Don't Know	1	.	.	.
Missing	29	.	.	.
0.01	1	0.55	1	0.55
0.1	1	0.55	2	1.10
0.14	1	0.55	3	1.65
0.2	1	0.55	4	2.20
0.4	1	0.55	5	2.75
0.8	1	0.55	6	3.30
2	1	0.55	7	3.85
2.7	3	1.65	10	5.49
2.9	2	1.10	12	6.59
3	2	1.10	14	7.69
3.1	1	0.55	15	8.24
3.2	12	6.59	27	14.84
3.25	1	0.55	28	15.38
3.3	6	3.30	34	18.68
3.36	10	5.49	44	24.18
3.4	2	1.10	46	25.27
3.43	1	0.55	47	25.82
3.44	24	13.19	71	39.01
3.45	3	1.65	74	40.66
3.47	6	3.30	80	43.96
3.49	1	0.55	81	44.51
3.5	26	14.29	107	58.79
3.51	3	1.65	110	60.44
3.52	2	1.10	112	61.54
3.55	3	1.65	115	63.19
3.6	5	2.75	120	65.93
3.61	3	1.65	123	67.58
3.62	3	1.65	126	69.23
3.7	2	1.10	128	70.33
3.73	2	1.10	130	71.43
3.75	1	0.55	131	71.98
3.81	1	0.55	132	72.53
3.85	1	0.55	133	73.08
4	12	6.59	145	79.67
4.5	3	1.65	148	81.32
5	4	2.20	152	83.52
9	1	0.55	153	84.07
9.95	1	0.55	154	84.62

Table 261 (continued): What was the average commodity price over the last three years

Q17	Frequency	Percent	Cumulative Frequency	Cumulative Percent
10	1	0.55	155	85.16
15	3	1.65	158	86.81
17	2	1.10	160	87.91
18.72	1	0.55	161	88.46
20	3	1.65	164	90.11
22	2	1.10	166	91.21
35.5	1	0.55	167	91.76
70	1	0.55	168	92.31
90	1	0.55	169	92.86
95	1	0.55	170	93.41
98	1	0.55	171	93.96
100	1	0.55	172	94.51
113	1	0.55	173	95.05
125	2	1.10	175	96.15
200	1	0.55	176	96.70
225	1	0.55	177	97.25
300	1	0.55	178	97.80
500	1	0.55	179	98.35
680	1	0.55	180	98.90
750	1	0.55	181	99.45
800	1	0.55	182	100.00

Table 262: Variable: Q17 (What was the average commodity price over the last three years)

	Moments	
N	182	Sum Weights
Mean	27.7637363	Sum Observations
Std Deviation	106.372353	Variance
Skewness	5.82273908	Kurtosis
Uncorrected SS	2188319.18	Corrected SS
Coeff Variation	383.134143	Std Error Mean
		182
		5053
		11315.0775
		35.6103037
		2048029.02
		7.88484339

Table 263: Basic Statistical Measures

Location	Variability
Mean 27.76374	Std Deviation 106.37235

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Columbia/Snake River Transportation Study 88 Casavant and Jessup May 2005

**Table 264:**

Median	3.50000	Variance	11315
Mode	3.50000	Range	799.99000
		Interquartile Range	0.60000
Quantiles (Definition 5)			
	Quantile	Estimate	
	100% Max	800.00	
	99%	750.00	
	95%	113.00	
	90%	20.00	
	75% Q3	4.00	
	50% Median	3.50	
	25% Q1	3.40	
	10%	3.20	
	5%	2.70	
	1%	0.10	
	0% Min	0.01	

The median was \$3.50 per ton, indicating that the grain price estimates were below this estimate, and 90% of the prices were still at or below \$20 (Table 262). Seventy four of the estimates were around \$3 and 64 were around \$4. No other common estimate is identifiable. Table 265 indicates how many estimates were in bushels, tons, gallons, etc. Bushels were quoted by 78% of the respondents, supporting our earlier statements of the two groups of different commodities.

Another attempt to determine the size of the facility was made by inquiring about the total amount of annual units shipped. Table 266 shows the broad array of volumes identified in response to this question. This table is in raw numbers so can include gallons, bushels, pounds, etc., with the units reported in Table 267, where bushels are almost 80% of the total. Descriptive statistics of a general nature are shown in Tables 268-270.

Particular attention was paid to the storage capacity that was available at this site. Again, respondents were asked to identify the unit used in estimating the storage capacity of the facility. The wide array of estimates are presented in Table 271, with the same conditions on units as was with the size of facility question above. Similar descriptive statistics are presented in Tables 272 to 277. Of potential use is a comparison of the storage capacity to the annual units shipped from the facility. The average units shipped, 2,725,691 were significantly larger than the average storage capacity of 1,402,009. A common indicator of capacity utilization is turnover ratio, which in this rough comparison, is 1.94.

**Table 265:** Variable: Q17 (What was the average commodity price over the last three years)

Missing Values			
Missing Value	Count	-----Percent Of-----	
		All Obs	Missing Obs
D	1	0.47	3.33
M	29	13.68	96.67
Total	30	14.15	100.00

**Table 266:** Frequency Counts

Percents				Percents			
Value	Count	Cell	Cum	Value	Count	Cell	Cum
0	1	0.5	0.5	3	1	0.5	44.5
0	1	0.5	1.1	4	26	14.3	58.8
0	1	0.5	1.6	4	3	1.6	60.4
0	1	0.5	2.2	4	2	1.1	61.5
0	1	0.5	2.7	4	3	1.6	63.2
1	1	0.5	3.3	4	5	2.7	65.9
2	1	0.5	3.8	4	3	1.6	67.6
3	3	1.6	5.5	4	3	1.6	69.2
3	2	1.1	6.6	4	2	1.1	70.3
3	2	1.1	7.7	4	2	1.1	71.4
3	1	0.5	8.2	4	1	0.5	72.0
3	12	6.6	14.8	4	1	0.5	72.5
3	1	0.5	15.4	4	1	0.5	73.1
3	6	3.3	18.7	4	12	6.6	79.7
3	10	5.5	24.2	5	3	1.6	81.3
3	2	1.1	25.3	5	4	2.2	83.5
3	1	0.5	25.8	9	1	0.5	84.1
3	24	13.2	39.0	10	1	0.5	84.6
3	3	1.6	40.7	10	1	0.5	85.2
3	6	3.3	44.0	15	3	1.6	86.8
				17	2	1.1	87.9
				19	1	0.5	88.5
				20	3	1.6	90.1
				22	2	1.1	91.2
				36	1	0.5	91.8
				70	1	0.5	92.3
				90	1	0.5	92.9
				95	1	0.5	93.4
				98	1	0.5	94.0
				100	1	0.5	94.5
				113	1	0.5	95.1
				125	2	1.1	96.2
				200	1	0.5	96.7
				225	1	0.5	97.3
				300	1	0.5	97.8
				500	1	0.5	98.4
				680	1	0.5	98.9
				750	1	0.5	99.5
				800	1	0.5	100.0

**Table 267:** Unit for this commodity

Q17A	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Missing	25	.	.	.
Tons	12	6.42	12	6.42
Bushels	145	77.54	157	83.96
Cwt.	17	9.09	174	93.05
Gallons	2	1.07	176	94.12
Other	11	5.88	187	100.00

**Table 268:** Total Amount of Annual Units Shipped

Q18	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Missing	16	.	.	.
0	1	0.51	1	0.51
20	1	0.51	2	1.02
60	1	0.51	3	1.53
250	1	0.51	4	2.04
500	1	0.51	5	2.55
2850	1	0.51	6	3.06
3000	1	0.51	7	3.57
5000	2	1.02	9	4.59
5800	1	0.51	10	5.10
6000	1	0.51	11	5.61
8000	1	0.51	12	6.12
8100	1	0.51	13	6.63
8320	1	0.51	14	7.14

9000	1	0.51	15	7.65
10000	2	1.02	17	8.67
14000	1	0.51	18	9.18
15000	1	0.51	19	9.69
18000	1	0.51	20	10.20
25000	2	1.02	22	11.22
28000	1	0.51	23	11.73
35000	1	0.51	24	12.24
50000	1	0.51	25	12.76
56000	2	1.02	27	13.78
60000	2	1.02	29	14.80
62000	2	1.02	31	15.82
65000	2	1.02	33	16.84
74685	1	0.51	34	17.35
75000	2	1.02	36	18.37
77144	1	0.51	37	18.88
88000	1	0.51	38	19.39
100000	8	4.08	46	23.47
104000	1	0.51	47	23.98
119729	1	0.51	48	24.49
120000	3	1.53	51	26.02
125000	1	0.51	52	26.53
142000	1	0.51	53	27.04
150000	4	2.04	57	29.08
153000	2	1.02	59	30.10
155000	1	0.51	60	30.61
160000	1	0.51	61	31.12
170000	2	1.02	63	32.14
178000	1	0.51	64	32.65
180000	1	0.51	65	33.16
182000	1	0.51	66	33.67
195983	1	0.51	67	34.18
196000	1	0.51	68	34.69
197000	1	0.51	69	35.20
198000	1	0.51	70	35.71
199259	1	0.51	71	36.22
200000	3	1.53	74	37.76
201000	1	0.51	75	38.27
202000	1	0.51	76	38.78
220000	1	0.51	77	39.29
222000	1	0.51	78	39.80
225000	1	0.51	79	40.31

Table 268 (continued):

Total Amount of Annual Units Shipped

018	Frequency	Percent	Cumulative Frequency	Cumulative Percent
234105	1	0.51	80	40.82
236000	1	0.51	81	41.33
250000	4	2.04	85	43.37
254367	1	0.51	86	43.88
255000	1	0.51	87	44.39
260000	2	1.02	89	45.41
284000	1	0.51	90	45.92
286170	1	0.51	91	46.43
287773	1	0.51	92	46.94
290000	1	0.51	93	47.45
294134	1	0.51	94	47.96
295451	1	0.51	95	48.47
300000	5	2.55	100	51.02
304000	1	0.51	101	51.53
310000	1	0.51	102	52.04
314000	1	0.51	103	52.55
320000	1	0.51	104	53.06
322000	1	0.51	105	53.57
334000	1	0.51	106	54.08
334080	1	0.51	107	54.59
350000	3	1.53	110	56.12
352000	1	0.51	111	56.63
357000	2	1.02	113	57.65
366000	1	0.51	114	58.16
391000	1	0.51	115	58.67
400000	1	0.51	116	59.18
400800	1	0.51	117	59.69
402735	1	0.51	118	60.20
415000	1	0.51	119	60.71
426000	1	0.51	120	61.22
431000	2	1.02	122	62.24
448000	1	0.51	123	62.76
450000	1	0.51	124	63.27
485773	1	0.51	125	63.78
500000	1	0.51	126	64.29
507000	1	0.51	127	64.80
514000	1	0.51	128	65.31
521000	1	0.51	129	65.82

522066	1	0.51	130	66.33
543000	1	0.51	131	66.84
548000	1	0.51	132	67.35
550000	2	1.02	134	68.37
595619	1	0.51	135	68.88
600000	8	4.08	143	72.96
619000	2	1.02	145	73.98
650000	1	0.51	146	74.49
700000	1	0.51	147	75.00
800000	2	1.02	149	76.02
900000	2	1.02	151	77.04
1000000	2	1.02	153	78.06
1073000	1	0.51	154	78.57
1100000	1	0.51	155	79.08
1110000	1	0.51	156	79.59
1140000	1	0.51	157	80.10
1164000	1	0.51	158	80.61

Table 268 (continued):

Total Amount of Annual Units Shipped				
Q18	Frequency	Percent	Cumulative Frequency	Cumulative Percent
1170000	1	0.51	159	81.12
1300000	1	0.51	160	81.63
1400000	2	1.02	162	82.65
1500000	1	0.51	163	83.16
1560000	1	0.51	164	83.67
1593000	1	0.51	165	84.18
1701715	1	0.51	166	84.69
2000000	1	0.51	167	85.20
2168000	1	0.51	168	85.71
2198000	1	0.51	169	86.22
2300000	1	0.51	170	86.73
2670000	1	0.51	171	87.24
2991000	1	0.51	172	87.76
3124279	1	0.51	173	88.27
3200000	1	0.51	174	88.78
3500000	1	0.51	175	89.29
4000000	2	1.02	177	90.31
5000000	3	1.53	180	91.84
5446276	1	0.51	181	92.35
6000000	2	1.02	183	93.37
9000000	1	0.51	184	93.88
10000000	3	1.53	187	95.41
11286142	1	0.51	188	95.92
12000000	1	0.51	189	96.43
12967234	1	0.51	190	96.94
14000000	1	0.51	191	97.45
15000000	1	0.51	192	97.96
19000000	1	0.51	193	98.47
40000000	1	0.51	194	98.98
90000000	1	0.51	195	99.49
158319967	1	0.51	196	100.00

Table 269:

Unit for this elevator				
Q18A	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Missing	19	.		
Tons	17	8.81	17	8.81
Bushels	153	79.27	170	88.08
Cwt.	13	6.74	183	94.82
Gallons	2	1.04	185	95.85
Other	8	4.15	193	100.00

Table 270:

Variable: Q18 (Total Amount of Annual Units Shipped)

Moments			
N	196	Sum Weights	196
Mean	2725690.74	Sum Observations	534235386
Std Deviation	13441110.4	Variance	1.80663E14
Skewness	9.58558299	Kurtosis	101.6551
Uncorrected SS	3.66855E16	Corrected SS	3.52294E16
Coeff Variation	493.126757	Std Error Mean	960079.312

Table 271:

Basic Statistical Measures			
Location		Variability	
Mean	2725691	Std Deviation	13441110
Median	300000	Variance	1.80663E14

Mode 100000 Range 158319967  
 Interquartile Range 630000

**Table 272:**

Quantiles (Definition 5)

Quantile	Estimate
100% Max	158319967
99%	90000000
95%	10000000
90%	4000000
75% Q3	750000
50% Median	300000
25% Q1	120000
10%	18000
5%	5800
1%	20
0% Min	0

**Table 273:**

Variable: Q18 (Total Amount of Annual Units Shipped)

Missing Values

Missing Value	Count	-----Percent All Obs	Of----- Missing Obs
M	16	7.55	100.00

**Table 274:**

Frequency Counts

Percents				Percents				Percents			
Value	Count	Cell	Cum	Value	Count	Cell	Cum	Value	Count	Cell	Cum
0	1	0.5	0.5	198000	1	0.5	35.7	543000	1	0.5	66.8
20	1	0.5	1.0	199259	1	0.5	36.2	548000	1	0.5	67.3
60	1	0.5	1.5	200000	3	1.5	37.8	550000	2	1.0	68.4
250	1	0.5	2.0	201000	1	0.5	38.3	595619	1	0.5	68.9
500	1	0.5	2.6	202000	1	0.5	38.8	600000	8	4.1	73.0
2850	1	0.5	3.1	220000	1	0.5	39.3	619000	2	1.0	74.0
3000	1	0.5	3.6	222000	1	0.5	39.8	650000	1	0.5	74.5
5000	2	1.0	4.6	225000	1	0.5	40.3	700000	1	0.5	75.0
5800	1	0.5	5.1	234105	1	0.5	40.8	800000	2	1.0	76.0
6000	1	0.5	5.6	236000	1	0.5	41.3	900000	2	1.0	77.0
8000	1	0.5	6.1	250000	4	2.0	43.4	1000000	2	1.0	78.1
8100	1	0.5	6.6	254367	1	0.5	43.9	1073000	1	0.5	78.6
8320	1	0.5	7.1	255000	1	0.5	44.4	1100000	1	0.5	79.1
9000	1	0.5	7.7	260000	2	1.0	45.4	1110000	1	0.5	79.6
10000	2	1.0	8.7	284000	1	0.5	45.9	1140000	1	0.5	80.1
14000	1	0.5	9.2	286170	1	0.5	46.4	1164000	1	0.5	80.6



15000	1	0.5	9.7	287773	1	0.5	46.9	1170000	1	0.5	81.1
18000	1	0.5	10.2	290000	1	0.5	47.4	1300000	1	0.5	81.6
25000	2	1.0	11.2	294134	1	0.5	48.0	1400000	2	1.0	82.7
28000	1	0.5	11.7	295451	1	0.5	48.5	1500000	1	0.5	83.2
35000	1	0.5	12.2	300000	5	2.6	51.0	1560000	1	0.5	83.7
50000	1	0.5	12.8	304000	1	0.5	51.5	1593000	1	0.5	84.2
56000	2	1.0	13.8	310000	1	0.5	52.0	1701715	1	0.5	84.7
60000	2	1.0	14.8	314000	1	0.5	52.6	2000000	1	0.5	85.2
62000	2	1.0	15.8	320000	1	0.5	53.1	2168000	1	0.5	85.7
65000	2	1.0	16.8	322000	1	0.5	53.6	2198000	1	0.5	86.2
74685	1	0.5	17.3	334000	1	0.5	54.1	2300000	1	0.5	86.7
75000	2	1.0	18.4	334080	1	0.5	54.6	2670000	1	0.5	87.2
77144	1	0.5	18.9	350000	3	1.5	56.1	2991000	1	0.5	87.8
88000	1	0.5	19.4	352000	1	0.5	56.6	3124279	1	0.5	88.3
100000	8	4.1	23.5	357000	2	1.0	57.7	3200000	1	0.5	88.8
104000	1	0.5	24.0	366000	1	0.5	58.2	3500000	1	0.5	89.3
119729	1	0.5	24.5	391000	1	0.5	58.7	4000000	2	1.0	90.3
120000	3	1.5	26.0	400000	1	0.5	59.2	5000000	3	1.5	91.8
125000	1	0.5	26.5	400800	1	0.5	59.7	5446276	1	0.5	92.3
142000	1	0.5	27.0	402735	1	0.5	60.2	6000000	2	1.0	93.4
150000	4	2.0	29.1	415000	1	0.5	60.7	9000000	1	0.5	93.9
153000	2	1.0	30.1	426000	1	0.5	61.2	10000000	3	1.5	95.4
155000	1	0.5	30.6	431000	2	1.0	62.2	11286142	1	0.5	95.9
160000	1	0.5	31.1	448000	1	0.5	62.8	12000000	1	0.5	96.4
170000	2	1.0	32.1	450000	1	0.5	63.3	12967234	1	0.5	96.9
178000	1	0.5	32.7	485773	1	0.5	63.8	14000000	1	0.5	97.4
180000	1	0.5	33.2	500000	1	0.5	64.3	15000000	1	0.5	98.0
182000	1	0.5	33.7	507000	1	0.5	64.8	19000000	1	0.5	98.5
195983	1	0.5	34.2	514000	1	0.5	65.3	40000000	1	0.5	99.0
196000	1	0.5	34.7	521000	1	0.5	65.8	90000000	1	0.5	99.5
197000	1	0.5	35.2	522066	1	0.5	66.3	158319967	1	0.5	100.0

Table 274:

Unit for this elevator

Q19A	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Missing	19	.	.	.
Tons	11	5.70	11	5.70
Bushels	161	83.42	172	89.12
Cwt.	10	5.18	182	94.30
Gallons	3	1.55	185	95.85
Other	8	4.15	193	100.00

Table 275:

Variable: Q19 (Total Amount of Storage Capacity)

	Moments	
N	195	Sum Weights
Mean	1402009.35	Sum Observations
Std Deviation	6228507.05	Variance
Skewness	11.0258486	Kurtosis
Uncorrected SS	7.90939E15	Corrected SS
Coeff Variation	444.255742	Std Error Mean

Table 276:

Basic Statistical Measures

Location		Variability	
Mean	1402009	Std Deviation	6228507
Median	366000	Variance	3.87943E13
Mode	200000	Range	79999987
		Interquartile Range	678000

Table 277:

Quantiles (Definition 5)

Quantile	Estimate
100% Max	80000000
99%	30000000

95%	3843000
90%	2198000
75% Q3	820000
50% Medi an	366000
25% Q1	142000
10%	45000
5%	14000
1%	800
0% Mi n	13

**Table 278:** Variable: Q19 (Total Amount of Storage Capacity)

Mi ssi ng Val ues			
Mi ssi ng Val ue	Count	----Percent Of----	Mi ssi ng Obs
M	17	8.02	100.00

**Table 279:** Frequency Counts

Percents				Percents				Percents			
Val ue	Count	Cell	Cum	Val ue	Count	Cell	Cum	Val ue	Count	Cell	Cum
13	1	0.5	0.5	182000	1	0.5	31.3	525000	2	1.0	62.6
800	1	0.5	1.0	189000	1	0.5	31.8	537000	1	0.5	63.1
1125	1	0.5	1.5	194000	1	0.5	32.3	561000	1	0.5	63.6
1500	1	0.5	2.1	197000	1	0.5	32.8	566000	1	0.5	64.1
2500	2	1.0	3.1	200000	8	4.1	36.9	567000	1	0.5	64.6
3270	1	0.5	3.6	203000	1	0.5	37.4	574000	1	0.5	65.1
6000	1	0.5	4.1	216000	1	0.5	37.9	581000	1	0.5	65.6
12000	1	0.5	4.6	220000	1	0.5	38.5	587000	1	0.5	66.2
14000	3	1.5	6.2	221000	1	0.5	39.0	598000	1	0.5	66.7
14950	1	0.5	6.7	222000	2	1.0	40.0	600000	2	1.0	67.7
20000	1	0.5	7.2	225000	1	0.5	40.5	606000	1	0.5	68.2
28000	1	0.5	7.7	235000	1	0.5	41.0	610000	1	0.5	68.7
30000	2	1.0	8.7	250000	1	0.5	41.5	611000	1	0.5	69.2
35500	1	0.5	9.2	255000	1	0.5	42.1	626000	1	0.5	69.7
40000	1	0.5	9.7	267000	1	0.5	42.6	638000	1	0.5	70.3
45000	1	0.5	10.3	269000	1	0.5	43.1	659312	1	0.5	70.8
50000	2	1.0	11.3	278000	1	0.5	43.6	687000	1	0.5	71.3
56000	1	0.5	11.8	284000	1	0.5	44.1	700000	1	0.5	71.8
58000	1	0.5	12.3	285000	1	0.5	44.6	745000	1	0.5	72.3
60000	1	0.5	12.8	300000	1	0.5	45.1	754000	2	1.0	73.3
62000	1	0.5	13.3	304000	1	0.5	45.6	768000	1	0.5	73.8
65000	1	0.5	13.8	314000	1	0.5	46.2	783000	1	0.5	74.4
66000	1	0.5	14.4	321000	1	0.5	46.7	799000	1	0.5	74.9
75000	1	0.5	14.9	325000	1	0.5	47.2	820000	1	0.5	75.4
80000	2	1.0	15.9	326000	1	0.5	47.7	831000	1	0.5	75.9
83000	1	0.5	16.4	336938	1	0.5	48.2	876000	1	0.5	76.4
90000	1	0.5	16.9	350000	1	0.5	48.7	900000	1	0.5	76.9
96000	1	0.5	17.4	352000	1	0.5	49.2	980000	1	0.5	77.4
100000	1	0.5	17.9	360000	1	0.5	49.7	1000000	3	1.5	79.0
102000	2	1.0	19.0	366000	1	0.5	50.3	1032000	1	0.5	79.5
110000	1	0.5	19.5	383416	1	0.5	50.8	1035000	1	0.5	80.0
115000	1	0.5	20.0	386000	1	0.5	51.3	1073000	1	0.5	80.5
120000	2	1.0	21.0	404000	2	1.0	52.3	1077000	1	0.5	81.0
123000	1	0.5	21.5	407000	1	0.5	52.8	1110000	1	0.5	81.5
125000	3	1.5	23.1	412000	1	0.5	53.3	1200000	1	0.5	82.1
132000	1	0.5	23.6	414000	1	0.5	53.8	1213000	1	0.5	82.6
140000	2	1.0	24.6	416000	1	0.5	54.4	1280000	1	0.5	83.1
142000	1	0.5	25.1	433000	2	1.0	55.4	1281000	1	0.5	83.6
143000	1	0.5	25.6	435000	1	0.5	55.9	1480000	1	0.5	84.1
148000	1	0.5	26.2	442000	1	0.5	56.4	1597000	1	0.5	84.6
150000	1	0.5	26.7	450000	2	1.0	57.4	1755000	1	0.5	85.1
155000	1	0.5	27.2	460000	2	1.0	58.5	1774000	1	0.5	85.6
159000	1	0.5	27.7	470000	1	0.5	59.0	1800000	1	0.5	86.2
160000	2	1.0	28.7	481000	1	0.5	59.5	1825000	1	0.5	86.7
172000	1	0.5	29.2	494000	1	0.5	60.0	1915000	1	0.5	87.2
175000	1	0.5	29.7	500000	1	0.5	60.5	1996000	1	0.5	87.7
178000	1	0.5	30.3	506000	1	0.5	61.0	2000000	2	1.0	88.7
180000	1	0.5	30.8	520000	1	0.5	61.5	2038000	1	0.5	89.2
2091000	1	0.5	89.7	2991000	1	0.5	93.3	4600000	1	0.5	96.9
2198000	1	0.5	90.3	3300000	1	0.5	93.8	5844000	1	0.5	97.4
2500000	1	0.5	90.8	3331000	1	0.5	94.4	7000000	1	0.5	97.9
2537000	1	0.5	91.3	3500000	1	0.5	94.9	11500000	1	0.5	98.5
2670000	1	0.5	91.8	3843000	1	0.5	95.4	12621000	1	0.5	99.0
2700000	1	0.5	92.3	4100000	1	0.5	95.9	30000000	1	0.5	99.5
2800000	1	0.5	92.8	4500000	1	0.5	96.4	80000000	1	0.5	100.0

## SURVEY DOCUMENTATION

The following information provides various aspects of the survey methodology and individual components so as to better document the process.

### Cover Letter – Grain Businesses

October 19, 2004

«company»  
«contact\_name», «contact\_title»  
«address»  
«city», «state» «zip»

Dear «contact\_name»:

The U.S. Army Corps of Engineers is currently evaluating policy changes related to the maintenance and support of the navigable waterway along the Snake and Columbia Rivers in our area. In order to assess the potential impact and demand responses to different levels of investment, the Corps is collecting information related to transportation movements along our waterway.

We need to know more about the transportation and shipping decisions you make when shipping your commodities. Enclosed is a questionnaire about Columbia / Snake River Transportation Choices and Needs for you to complete, one for each individual elevator.

All of the information you provide on this questionnaire will be kept strictly confidential. A code number is printed on the back page; this is only used to check your code number off the mailing list when it is returned. We have included a token of our appreciation as a way of saying thanks for helping with this study.

We hope you will complete and return the questionnaire so that we can have the benefit of knowing your opinions and decisions regarding shipping and transportation choices available at the different elevators in our region. Previous experience suggests each questionnaire takes 5-10 minutes to complete.

We would be happy to answer any questions that you might have about this study or your participation. Feel free to call us at (800) 833-0867 and ask for the Transportation Choice Survey, or send a fax message to (509) 335-0116. You can also email me at [KJMiller@wsu.edu](mailto:KJMiller@wsu.edu) if you prefer.

Thank you for your assistance!

Sincerely,

Ken Casavant  
Professor of Agricultural Economics  
School of Economic Sciences  
Washington State University

Kent Miller  
Study Director  
Social & Economic Sciences Research Center  
Washington State University

PS. This project has been reviewed and approved by the Washington State University Institutional Review Board. If you have any questions concerning your rights about participating in this project, please contact 509-335-9661 and ask for the IRB coordinator.

## Cover Letter – Port Businesses

November 5, 2004

«company»  
«contact\_name»  
«address»  
«city», «state» «zip»

Dear «contact\_name»:

The U.S. Army Corps of Engineers is currently evaluating policy changes related to the maintenance and support of the navigable waterway along the Snake and Columbia Rivers in our area. In order to assess the potential impact and demand responses to different levels of investment, the Corps is collecting information related to transportation movements along our waterway.

We need to know more about the transportation and shipping decisions you make when shipping your commodities. Enclosed is a questionnaire about Columbia / Snake River Transportation Choices and Needs for you to complete.

All of the information you provide on this questionnaire will be kept strictly confidential. A code number is printed on the back page; this is only used to check your code number off the mailing list when it is returned. We have included a token of appreciation as this is a unique and important study for our region.

We hope you will complete and return the questionnaire so that we can have the benefit of knowing your opinions and decisions regarding shipping and transportation choices available of the different shippers in our region. Previous experience suggests each questionnaire takes 5-10 minutes to complete.

We would be happy to answer any questions that you might have about this study or your participation. Feel free to call us at (800) 833-0867 and ask for the Transportation Choice Survey, or send a fax message to (509) 335-0116. You can also email me at [KJMiller@wsu.edu](mailto:KJMiller@wsu.edu) if you prefer.

Thank you for your assistance!

Sincerely,

Ken Casavant  
Professor of Agricultural Economics  
School of Economic Sciences  
Washington State University

Kent Miller  
Study Director  
Social & Economic Sciences Research Center  
Washington State University

PS. This project has been reviewed and approved by the Washington State University Institutional Review Board. If you have any questions concerning your rights about participating in this project, please contact 509-335-9661 and ask for the IRB coordinator.

## Follow-Up Postcard

Recently, we mailed a questionnaire(s) to you entitled "Columbia/Snake River Transportation Choice and Needs Survey – 2004." If they have already been completed and returned, please accept our sincere thanks. If not, could you do so as soon as possible; your views regarding the maintenance, support, and your use of the navigable waterway along the Snake and Columbia Rivers are very insightful and important. The U.S. Army Corps of Engineers is evaluating policy changes of investments related to that waterway,

If you did not receive a questionnaire, or it was misplaced, please call us toll free at (800) 833-0867, send us a fax message at (509) 335-0116, or send an email message to [kjmiller@wsu.edu](mailto:kjmiller@wsu.edu). We will then quickly mail you a replacement.

Ken Casavant  
Professor of Agricultural Economics  
School of Economic Sciences

Washington State University  
Pullman, WA 99164

Kent Miller  
Study Director  
SESRC

Washington State University  
Pullman, WA 99164-1801

## Follow-Up Letter

November 12, 2004

«company»  
«contact\_name», «contact\_title»  
«address»  
«city», «state» «zip»

Dear «contact\_name»:

About three weeks ago, we wrote to you about the Columbia / Snake River Transportation Choice and Needs Survey. As of today, we have not received your completed questionnaire(s). We realize that this is a busy time of the year and you may not have had time yet to complete it. However, we would sincerely appreciate hearing from you. The purpose of the survey is to gather as much information as possible for the U.S. Army Corps of Engineers in support, maintenance of, and access to the navigable waterways along the Snake and Columbia Rivers.

We are writing to you again because your questionnaire(s) is important to the usefulness of this study. In order to truly represent the operations, needs and opinions of all grain shippers in the state, on the water or not, it is important that each questionnaire be completed. We have included another token of appreciation to emphasize the importance of this study.

All of the information you provide will be kept strictly confidential. Your participation is voluntary and you may skip any question you prefer not to answer.

If you have any questions or would like help completing the survey, please call toll free at (800) 833-0867 and ask for the "Transportation Choice Survey" or send a fax message to (509) 335-0116. You may also send an email message to [KJMiller@wsu.edu](mailto:KJMiller@wsu.edu) if you prefer.

Thanks for your help!

Sincerely,

Ken Casavant  
Professor of Agricultural Economics  
School of Economic Sciences

Kent Miller  
Study Director  
SESRC

## Coding Manual

Changes made to coding manual after coding began are in *italics*. The symbols listed below indicate the date of the change, and surround the changes made.

- **GENERAL CODING INSTRUCTIONS:** Any question not answered, or with more than one answer, is coded as "M". (Addition: *except where specified.*) Answers such as "Don't Know", "Not Sure", and "?" are coded as "D". (Addition: unless "don't know" is offered as a category.) Missing values, such as "M" and "D" will *not* follow skip patterns, they will continue to the next question. Answers of "None", "-", or "/" will be entered as "0".
- **Range Coding:** If the answer given is a range of values, take the average. If this average is a fraction, round based on the ID# -- round to the even number if the ID# is even, to the odd number if the ID# is odd. This coding will be used on all questions with a notation **CODING: Range coding** in the "coding instructions" column. If an answer given includes a decimal or a fraction, round to the nearest whole number. If exactly ½ or .5, round based on the ID# -- round to the even number if the ID# is even, to the odd number if the ID# is odd.
- **Multiple Answer Reminder:** Please place a √ next to questions where the CATI will allow more than one answer to be entered. Noted by "**CODING: Use check reminder**" in the "coding instructions" column.
- **Yes / No Coding:** If there are only some "yes" answers given, but other items are unanswered, code the unanswered as "no". Similarly, if the number or letter to the left of the item is circled, code those circled as "yes" and those not as "no". However, if there are any "no" answers given, or if ONLY "no" answers are given, code those items unanswered as missing ("M"). This coding will be used on all questions with a notation **CODING: Yes / No coding** in the "coding instructions" column. Answers such as "n/a" will be coded as missing ("M").

**Questions to check for coding issues:** Skim entire questionnaire.

Q#	Type; Range	Entry	Skip To	Coding Instructions
ID#	N; 1001-78001			SESRC ID#
CINI	A; 3 characters			Coder's Initials
Q1	A; 30 characters			<b><i>What is the primary commodity you ship from this elevator</i></b>
Q2	A; 30 characters			How large was your last single outbound shipment
Q2a	C; 1-5	5		Type of unit for last single outbound shipment
Q3A_L- Q3C_L	C; 1-2			Do you have loading capabilities for...
Q3A_U- Q3C_L	C; 1-2			Do you have unloading capabilities for...
Q3B	N; 1-500			How close is the nearest barge loading facility
Q3C	N; 1-500			How close is the nearest rail loading facility
Q4	MA; 1-5			Type of transportation you use most often from this location
Q5	A; 30 characters			Commodity was shipped in your very last freight shipment
Q6A1	C; 1-2	2	Q6A2	Available: Truck to Pasco then Barge to Portland
Q6B1_T	D.2; 0.00-10.00			Transportation rate: Truck to Pasco
Q6B1_B	D.2; 0.00-10.00			Transportation rate: Barge to Portland

Q6C1	N; 1-99			Average shipment time: Truck to Pasco then Barge to Portland
Q6D1	N; 0-100			Percent of on-time arrivals: Truck to Pasco then Barge to Portland
Q6A2	C; 1-2	2	Q6A3	Available: Truck to (Blank) then Barge to Portland
Q6_Port	A; 30 characters			Write in River port other than Pasco
Q6B2_T	D.2; 0.00-10.00			Transportation rate: Truck to (Blank)
Q6B2_B	D.2; 0.00-10.00			Transportation rate: Barge to Portland
Q6C2	N; 1-99			Average shipment time: Truck to (Blank) then Barge to Portland
Q6D2	N; 0-100			Percent of on-time arrivals: Truck to Pasco then Barge to Portland
Q6A3	C; 1-2	2	Q6A4	Available: Rail to Portland
Q6B3_R	D.2; 0.00-10.00			Transportation rate: Rail to Portland
Q6C3	N; 1-99			Average shipment time: Rail to Portland
Q6D3	N; 0-100			Percent of on-time arrivals: Rail to Portland
Q6A4	C; 1-2	2	Q6A5	Available: Truck to Rail then Rail to Portland
Q6B4_T	D.2; 0.00-10.00			Transportation rate: Truck to Rail
Q6B4_R	D.2; 0.00-10.00			Transportation rate: Rail to Portland
Q6C4	N; 1-99			Average shipment time: Truck to Rail then Rail to Portland
Q6D4	N; 0-100			Percent on-time arrivals: Truck to Rail then Rail to Portland
Q6A5	C; 1-2	2	Q6A6	Available: Barge to Portland
Q6B5_B	D.2; 0.00-10.00			Transportation rate: Barge to Portland
Q6C5	N; 1-99			Average shipment time: Barge to Portland
Q6D5	N; 0-100			Percent on-time arrivals: Barge to Portland
Q6A6	C; 1-2	1	Q6_Other	Available: Other <i>If not answered, code as 2</i>
Q6_other	A; 30 characters			
Q6B6	D.2; 0.00-10.00			Transportation rate: Other
Q6C6	N; 1-99			Average shipment time: Other
Q6D6	N; 0-100			Percent on-time arrivals: Other
Q7	C; 1-6			Use for very last freight shipment
Q8	C; 1-7	7	Q12	Alternative transportation mode/destination
Percent	C; 10, 20, 30, 40, 50, 60			Percent change
Q9	C; 1-2	1	Q10	If transportation rate increased xx%, would you switch to alternative
Q9a	N; 1-1000			Percentage increase in transportation rate needed to switch
Q10	C; 1-2	1	Q11	If transit time increased xx%, would you switch to alternative
Q10a	N; 1-1000			Percentage increase in transit time needed to switch
Q11	C; 1-2	1	Q12	If reliability decreased xx%, would you switch to



				alternative
Q11a	N; 1-1000			Percentage decrease in reliability need to switch
Q12	N; 1-125			Length elevator has been at the current location
Q13	C; 1-5			Importance of logistic costs in determining plant location
Q14_ckeck	C; 1-2	1	Q15	Check here if you would not relocate (2=not checked) <i>If box is checked and answer given, enter as "2-not checked" and put percentage in F5 notes</i>
Q14	N; 1-100			Percentage decrease in logistic and transportation costs necessary to relocate
Q15IA-Q15ID	C; 1-2	2	next	Is this mode used for Inbound shipments Yes=1 and No=2
Q15IA_%-Q15ID_%	N; 1-100			Percentage of total shipments that come in this way Total =100%
Q15OA-Q15OD	C; 1-2	2	next	Is this mode used for Outbound shipments Yes=1 and No=2
Q15OA_%-Q15OD_%	N; 1-100			Percentage of total shipments that go out this way Total =100%
Q16_ckeck	C; 1, 2	1	Q17	Check here if you cannot load or unload rail cars at this facility (2=not checked)
Q16	N; 1-150			How many rail cars can be loaded or unloaded at your facility
Q17	D.2; 0-100			What was the average commodity price over the last three years
Q17a	C; 1-5			Unit for this commodity in Q17
Q18	N; 1-10,000,000			How large is this elevator facility
Q18a	C; 1-5			Unit for this elevator in Q18
Q19	N; 1-10,000,000			Total Amount of storage capacity
Q19a	C; 1-5			Unit for this elevator in Q19
N1-N3	T			

DEFINITIONS FOR THE "TYPE" COLUMN ABBREVIATIONS:

- C = Categorical question with set answers listed in the questionnaire for the respondent to choose from. A simple frequency table is produced in the listing.
- N = Numeric question – Respondent is allowed to give any whole number as an answer. The numbers (N; 1-99) indicate the range of answers SESRC believes would be acceptable responses. These questions will have a univariate procedure, listing the mean, median, mode, lowest value, and highest value in addition to the normal frequency table.
- D = Decimal question. Similar to a numeric question, but allows respondents to give a fraction answer. The data is handled exactly the same as a numeric question.
- A = Question allows alphabetic entries only. Usually these are questions where the respondent is asked to choose one item from a list. A simple frequency table is produced in the listing.

- T (text) = Questions that allow respondent to write in any answer they choose. These are often called “open-ended” or “comments” questions. The verbatim response is entered by SESRC, and the answers are kept in a separate file from the other, numeric data.
- MA = A categorical question with set answers listed in the questionnaire for the respondent to choose from -- except that they can choose more than one of the answers listed.

### FREQUENTLY USED CODING DECISIONS:

The following can be copied into any coding manual. This page should be deleted once the coding manual is written.

#### Under the “General Coding Instructions” Section

- Any question not answered, or with more than one answer, is coded as “M”. (Addition: *except where specified.*)
- Answers such as “Don’t Know”, “Not Sure”, and “?” are coded as “D”. (Addition: unless “don’t know” is offered as a category.)
- Missing values, such as “M” and “D” will *not* follow skip patterns, they will continue to the next question.
- Answers of “None”, “-”, or “/” will be entered as “0”.
- Range Coding: If the answer given is a range of values, take the average. If this average is a fraction, round based on the ID# -- round to the even number if the ID# is even, to the odd number if the ID# is odd. This coding will be used on all questions with a notation **CODING: Range coding** in the “coding instructions” column.
- If an answer given includes a decimal or a fraction, round to the nearest whole number. If exactly ½ or .5, round based on the ID# -- round to the even number if the ID# is even, to the odd number if the ID# is odd.
- Multiple Answer Reminder: Please place a √ next to questions where the CATI will allow more than one answer to be entered. Noted by **CODING: Use check reminder** in the “coding instructions” column.
- Yes / No Coding: If there are only some “yes” answers given, but other items are unanswered, code the unanswered as “no”. Similarly, if the number or letter to the left of the item is circled, code those circled as “yes” and those not as “no”. However, if there are any “no” answers given, or if ONLY “no” answers are given, code those items unanswered as missing (“M”). This coding will be used on all questions with a notation **CODING: Yes / No coding** in the “coding instructions” column.
- Yes / No “Other”: If there is an “other” category, but neither “yes” nor “no” is answered, then: If there is text, code as “yes”; if there is no text, code as “no”. This question should NOT be M unless the whole list is not answered.
- Answers such as “n/a” will be coded as missing (“M”).
- List question “other”: If there is no rating for this option code as follows: If there is no text, code as M; if there is text, create a code.

#### Under the “Coding Instructions” Column

- **CODING: Use check reminder.**
- **CODING: Yes / No coding.** (Or if only on one or two questions, use from above)
- **CODING: Range coding.** (Or if only on one or two questions, use from above)
- For a yes / no series question (or a yes/no/not applicable or don’t know series) with an “other” item: **CODING: If there is an answer given in the text portion of the “other” item, but the yes/no is not answered, assume a “yes”, if no answer in the text portion, assume “no”. (There should be no missing “M” unless the entire page is unanswered.)**
- For a series question with other than yes / no categories with an “other” item: **CODING: If there is an answer given in the text portion of the “other” item, but the rating is**

- not answered, code as (create code #); if no answer in the text portion, code as missing (“M”).**
- For education level question: **CODING: Code as the highest number answered.**
  - For multiple answers on a stand alone question with an other option, and the Study Director does not want to allow multiple answers in the CATI: **CODING: If multiple answers are given, code as (other option #) and type in text from all categories answered.**
  - For numeric answers with a qualifier: **CODING: If the answer includes a “+”, “over”, or “>” type of qualifier, code as the number given and ignore the qualifier.**
  - Race / Ethnicity: Allow a multiple answer.
  - Education Level: Code as the highest number circled.
  - Screening questions: If the respondent does not follow the indicated branching pattern, create a code, and don’t have it follow the branch.

## Questionnaire – Cati Screens

Q1: What is the primary commodity you ship from this elevator?

@Q1

Q2: How large was your last single outbound shipment?

@Q2

@Q2A Q2A:Type of unit for last single outbound shipment

- 1 = Tons
- 2 = Bushels
- 3 = Cwt.
- 4 = Gallons
- 5 = Other

D = Don't know M = Missing

---

@Q3A\_L Q3A\_L: Do you have loading capabilities for:Trucks

@Q3B\_L Q3B\_L: Do you have loading capabilities for:Barges

@Q3C\_L Q3C\_L: Do you have loading capabilities for:Rail Cars

@Q3A\_U Q3A\_U: Do you have loading capabilities for:Trucks

@Q3B\_U Q3B\_U: Do you have loading capabilities for:Barges

@Q3C\_U Q3C\_U: Do you have loading capabilities for:Rail Cars

- 1 = Yes
- 2 = No

Q3B: How close is the nearest barge loading facility to this facility?

@Q3B miles

Q3C: How close is the nearest rail loading facility to this facility?

@Q3C miles

D = Don't know M = Missing

---

Q4: Type of transportation do you use most often from this location

@Q4

- 1 = Private Truck
- 2 = For-Hire Truck
- 3 = Barge
- 4 = Rail
- 5 = Other
- D = Don't know
- M = Missing

---

Q5: What commodity was shipped in your very last freight shipment?

@Q5

D = Don't know M = Missing

@Q6A1 Q6A1: Available :Truck to Pasco then Barge to Portland  
1 = Yes 2 = No

Q6B1T: Transportation rate:Truck to Pasco  
@Q6B1T Truck

Q6B1B: Transportation rate:Barge to Portland  
@Q6B1B Barge

Q6C1: Average shipment time: Truck to Pasco then Barge to Portland  
@Q6C1 Days

Q6D1: Percent of on time arrive : Truck to Pasco then Barge to Portland>  
@Q6D1 % on-time arrivals

D = Don't know M = Missing

---

---

@Q6A2 Q6A2: Available :Truck to river port then Barge to Portland  
1 = Yes 2 = No

Q6Pot: Truck to river port other than Pasco  
@Q6Pot  
Q6B2T: Transportation rate:Truck to river port  
@Q6B2T Truck

Q6B2B: Transportation rate:Barge to Portland  
@Q6B2B Barge

Q6C2: Average shipment time: Truck to river port then Barge to Portland  
@Q6C2 Days

Q6D2: Percent of on time arrive : Truck to river port then Barge to Portland  
@Q6D2 % on-time arrivals

D = Don't know M = Missing

---

---

@Q6A3 Q6A3: Available :Rail to Portland

1 = Yes 2 = No

Q6B3R: Transportation rate:Rail to Portland  
@Q6B3R Rail

Q6C3: Average shipment time: Rail to Portland  
@Q6C3 Days

Q6D3: Percent of on time arrive : Rail to Portland  
@Q6D3 % on-time arrivals

D = Don't know M = Missing

---

---

@Q6A4 Q6A4: Available :Truck to Railroad then Rail to Portland  
1 = Yes 2 = No

Q6B4T: Transportation rate:Truck to Railroad  
@Q6B4T Truck

Q6B4R: Transportation rate:Rail to Portland  
@Q6B4R Barge

Q6C4: Average shipment time: Truck to Railroad then Rail to Portland  
@Q6C4 Days

Q6D4: Percent of on time arrive : Truck to Railroad then Rail to Portland  
@Q6D4 % on-time arrivals

D = Don't know M = Missing

---

---

@Q6A5 Q6A5: Available :Barge to Portland  
1 = Yes 2 = No

Q6B5B: Transportation rate:Barge to Portland  
@Q6B5B Barge

Q6C5: Average shipment time: Barge to Portland  
@Q6C5 Days

Q6D5: Percent of on time arrive : Barge to Portland  
@Q6D5 % on-time arrivals

D = Don't know M = Missing

---

---

@Q6A6 Q6A6: Available :other  
1 = Yes 2 = No

Q6OT other  
@Q6OT

Q6B6: Transportation rate:other  
@Q6B6

Q6C6: Average shipment time: other  
@Q6C6 Days

Q6D6: Percent of on time arrive : other  
@Q6D6 % on-time arrivals

D = Don't know M = Missing

---

---

@Q7 Q7: Use for your very last freight shipment

@Q8 Q8: Alternative transportation mode/destination

- 1 = Truck to Pasco then Barge to Portland
- 2 = Truck to \_then Barge to Portland
- 3 = Rail to Portland
- 4 = Truck to Railroad then Rail to Portland5
- 5 = Barge to Portland
- 6 = Other (Specify mode and destination)

7 = No alternatives available  
D = Don't know  
M = Missing

---

---

@Perct Perct: Percent change

- 1 = 10
- 2 = 20
- 3 = 30
- 4 = 40
- 5 = 50
- 6 = 60

@Q9 Q9: If the transportation rate increased XX%, would you switch to the alternative

- 1 = Switch to Alternative mode
- 2 = Continue to use Original mode

Q9A: Percentage increase in the transportation rate need to switch  
@Q9A % increase

D = Don't know M= Missing

---

---

@Q10 Q10: If the transit time increased XX%, would you switch to the alternative

- 1 = Switch to Alternative mode
- 2 = Continue to use Original mode

Q10A: Percentage increase in the transit time need to switch  
@Q10A % increase

@Q11 Q11: If the reliability decreased XX%, would you switch to the alternative

- 1 = Switch to Alternative mode
- 2 = Continue to use Original mode

Q11A: Percentage decrease in the reliability need to switch  
@Q11A % decrease

---

---

@Q12 Q12:Length elevator has been at current location>

@Q13 Q13:Importance of logistic costs in determining your plant location

- 1 = Very important
- 2 = Somewhat important
- 3 = Not very important
- 4 = Not important at all
- 5 = Not applicable

D = Don't know  
M = Missing

---

---

@Q14CK Q14CK: Check here if you would not relocate.

1= Checked 2= Not checked

Q14: Percentage decrease in logistics and transportation costs necessary to relocate

@Q14 % decrease in costs

M = Missing

---

---

@Q15IA Q15IA:Is this mode used:Private Truck  
@Q15IB Q15IB:Is this mode used:For-Hire Truck  
@Q15IC Q15IC:Is this mode used:Barge  
@Q15ID Q15ID:Is this mode used:Rail

1 = Yes 2 = No

@Q15I1 Q15I1:Percentage of total shipments that come in this way:  
Private Truck

@Q15I2 Q15I2:Percentage of total shipments that come in this way:  
For-Hire Truck

@Q15I3 Q15I3:Percentage of total shipments that come in this way:Barg

@Q15I4 Q15I4:Percentage of total shipments that come in this way:Rail

D = Don't know M = Missing

---

---

@Q150A Q150A:Is this mode used:Private Truck  
@Q150B Q150B:Is this mode used:For-Hire Truck  
@Q150C Q150C:Is this mode used:Barge  
@Q150D Q150D:Is this mode used:Rail

1 = Yes 2 = No

@Q1501 Q1501:Percentage of total shipments that come in this way:  
Private Truck

@Q1502 Q1502:Percentage of total shipments that come in this way:  
For-Hire Truck

@Q1503 Q1503:Percentage of total shipments that come in this way:Barg

@Q1504 Q1504:Percentage of total shipments that come in this way:Rail

D = Don't know M = Missing



@Q16CK Q16CK: Check here if you cannot load or unload rail cars  
at this facility.

1= Checked 2= Not Checked

Q16: How many rail cars can be loaded or unloaded at your facility  
@Q16 # of cars

M = Missing

---

---

Q17:What was the average commodity price over the last three years  
@Q17 price per unit

@Q17A Q17A:Unit for this commodity

- 1 = Tons
- 2 = Bushels
- 3 = Cwt.
- 4 = Gallons
- 5 = Other

D= Don't know M = Missing

---

---

Q18:Capacity of elevator of facility: Annual Units Shipped  
@Q18 Total Amount of Annual Units Shipped

@Q18A Q18A:Unit for this elevator

- 1 = Tons
- 2 = Bushels
- 3 = Cwt.
- 4 = Gallons
- 5 = Other

D= Don't know M = Missing

---

---

Q19:Capacity of elevator of facility: Amount of Storage Capacit  
@Q19 Total Amount of Storage Capacity

@Q19A Q19A:Unit for this elevator

- 1 = Tons
- 2 = Bushels
- 3 = Cwt.
- 4 = Gallons
- 5 = Other

D= Don't know M = Missing

---

---

Comments from page 15 of questionnaire:

@N1 Ending Comment  
@N2 Ending Comment  
@N3 Ending Comment

1 = Comment Present  
2 = No Comment

---

---

```
-----  
- @INT Enter the Termination Code -  
-----  
- CM - 1st Entry -  
- VM - Verified Entry -  
- ZZ - Practice Case -  
-----
```

---

---

Please double check the INT code

INT now is <INT >

@check

1 YES IT IS A 1st entry  
2 YES IT IS A Verified entry  
3 YES IT IS A Wrong Izzy Case / Practice Case

---

---

## Daily Tally Sheets

Columbia/Snake River Transportation Choice and Needs Survey - 2004

### Companies Sample

Project: ELEV                      Prior letter:  
    First Mailing: 10/19/2004  
 Study Director: Kent              Postcard: 10/27/2004  
    Second Mailing: 11/10/2004  
 Sample Size: 78

	Cumulative	Daily			No		
Date	Complete	Complete	Refusals	Ineligible	RTS	Other	Response
							78
10/25/2004	3	3	0	1	0	0	74
10/26/2004	8	5	0	0	0	0	69
10/27/2004	15	7	0	0	0	0	62
10/28/2004	22	7	0	0	1	0	54
10/29/2004	25	3	0	0	0	0	51
11/01/2004	28	3	0	0	0	0	48
11/03/2004	36	8	0	1	0	0	39
11/04/2004	37	1	0	0	0	0	38
11/05/2004	38	1	0	0	0	0	37
11/08/2004	39	1	0	1	0	0	35
11/10/2004	40	1	0	0	0	0	34
11/15/2004	41	1	0	1	0	0	32
11/16/2004	41	0	1	0	0	0	31
11/17/2004	41	0	1	0	0	0	30
11/18/2004	44	3	0	0	0	0	27
11/19/2004	45	1	0	3	0	0	23
11/30/2004	47	2	0	0	0	0	21
12/08/2004	48	1	0	0	0	0	20
12/29/2004	49	1	0	0	0	0	19
=====							
		2	7	1	0		

\* Response Rate: 62.82 % \*      \* Completion Rate: 70.00 % \*  
 (cm's/sample size)              (cm's/(cm's+rf's+no response))

Columbia/Snake River Transportation Choice and Needs Survey - 2004

**Warehouses**

Project: ELEV                      Prior letter:  
     First Mailing: 10/19/2004  
 Study Director: Kent                Postcard: 10/27/2004  
     Second Mailing: 11/10/2004  
 Sample Size: 414

Cumulative Daily			No				Other Response
Date	Complete	Complete	Refusals	Ineligible	RTS		
							414
10/25/2004	8	8	0	1	0	0	405
10/26/2004	22	14	0	0	0	3	388
10/27/2004	68	46	0	3	0	20	319
10/28/2004	85	17	8	1	0	2	291
10/29/2004	88	3	0	0	0	0	288
11/01/2004	97	9	0	2	0	6	271
11/03/2004	113	16	0	4	0	3	248
11/04/2004	115	2	0	0	0	0	246
11/05/2004	129	14	0	3	0	1	228
11/08/2004	130	1	0	1	0	0	226
11/10/2004	131	1	0	0	0	0	225
11/15/2004	154	23	0	2	0	5	195
11/16/2004	154	0	44	0	0	0	151
11/17/2004	154	0	3	0	0	0	148
11/18/2004	165	11	0	1	0	0	136
11/19/2004	166	1	0	3	0	0	132
11/22/2004	167	1	0	0	0	0	131
11/23/2004	169	2	0	1	0	0	128
11/30/2004	174	5	0	0	0	0	123
12/08/2004	180	6	0	0	0	5	112
12/16/2004	180	0	0	1	0	0	111
12/29/2004	181	1	0	0	0	0	110

=====  
 55       23       0       45

\* Response Rate: 43.72 % \*       \* Completion Rate: 52.31 % \*  
 (cm's/sample size)                (cm's/(cm's+rf's+no response))







The NETS research program is developing a series of practical tools and techniques that can be used by Corps navigation planners across the country to develop consistent, accurate, useful and comparable information regarding the likely impact of proposed changes to navigation infrastructure or systems.

The centerpiece of these efforts will be a suite of simulation models. This suite will include:

- A model for forecasting **international and domestic traffic flows** and how they may be affected by project improvements.
- A **regional traffic routing model** that will identify the annual quantities of commodities coming from various origin points and the routes used to satisfy forecasted demand at each destination.
- A **microscopic event model** that will generate routes for individual shipments from commodity origin to destination in order to evaluate non-structural and reliability measures.

As these models and other tools are finalized they will be available on the NETS web site:

<http://www.corpsnets.us/toolbox.cfm>

The NETS bookshelf contains the NETS body of knowledge in the form of final reports, models, and policy guidance. Documents are posted as they become available and can be accessed here:

<http://www.corpsnets.us/bookshelf.cfm>

