#SAFE Evaluation

Interim Report

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Introduction

The purpose of this survey was to investigate system users' perceptions of the effectiveness of the cellular-based #SAFE road conditions and weather forecasting system available in North and South Dakota. The results of the analysis will be used to improve the quality of services rendered, as well as to gain insight into the possible development of an alternative long-term, user-fee supported program to provide this information.

Survey Design

The specific objectives of the survey were to assess the availability, accuracy and effectiveness of the system, as well as to determine users' willingness to pay and #SAFE awareness. The various sections of the survey solicited the following types of information.

- basic travel characteristics
- travel information needs
- amount and/or likelihood of #SAFE use
- qualitative assessment of #SAFE system
- willingness to pay
- demographic information

The survey questions and design used in this study are shown in Appendix A.

Two types of response options were used throughout the survey: multiple choice and ordinal ratings. The multiple-choice questions each contained between 4 and 10 response categories. For the rated responses, survey respondents were instructed to select one of three values they felt best represented their behavior or opinion regarding a particular topic. The ordinal nature of such a scale allows conclusions to be drawn on a <u>relative basis only</u>. Differences between response values <u>cannot be quantified</u> because each respondent's assessment of the intervals between the response categories will vary. In general, results from specific questions on this survey are qualitative and are intended to make general improvements and modifications to the #SAFE system. More specific details and recommendations would need to come from additional investigations.

Survey Administration

Survey administration was designed to target cellular telephone owners in North and South Dakota. A simple random sample of 3500 cellular users within North and South Dakota was purchased from USWest Dex (now Qwest) Data Products Group. The list of individuals was geographically diverse across the two-state region. From the 3500 surveys sent out, 1128 were returned, resulting in a response rate of 32.2%. To improve the rate of response, a drawing of five winners from those who responded before August 10, 2000 was conducted as an incentive.

The prize for each winner was $100 of free gasoline from Conoco. Once the surveys were mailed, no attempt was made to encourage those who did not respond to do so.

The survey was distributed using first class U.S. mail. Included in the mail-out package was a cover letter, a survey, a small card to enter the $100 free gasoline drawing, and a postage paid return envelope.

Statistics

The responses to the #SAFE survey were analyzed using various summary statistics, including percentages, frequencies and chi-squared values. Results were used to determine user assessment of the system, traveler information needs and willingness to pay for use of the system. Differences in responses were investigated between respondents in selected demographic categories using the chi-squared analysis.

Respondents had the option of not responding to any question on the survey. Percentages are based on total responses obtained for each question, as opposed to the total number of survey respondents, thereby eliminating the need for an "unknown" or " no response" category for each question. In addition, if more than one option was selected for questions requiring only a single response, all responses from that individual to that particular question were omitted from the statistical analysis. This was done to avoid biasing the results by arbitrarily choosing which option among several selected by the respondent was to be included. Failure to comply with written instructions also resulted in omission of that respondent's particular response from the data analysis.

Demographic Characteristics

Demographic questions were asked to ensure that responses to the survey were properly represented when the data were analyzed. Questions asked were related to:

1. residence,
2. gender,
3. age,
4. type of vehicle normally driven,
5. primary purpose of travel,
6. average number of miles per trip,
7. number of cellular telephones,
8. current cellular carriers, and
9. household income.

Other data used for demographic comparisons included frequency of travel on U.S. or Interstate highways in North or South Dakota, how often respondents use the #SAFE system, and when they use the system. The table provided in Appendix B shows the questions that were analyzed using the chi-squared analysis. This table shows where the chi-squared analysis was invalid due to lack of data and where differences in responses were determined.

Residence

The survey was sent to 1802 (51.5%) North Dakota residents and 1698 (48.5%) South Dakota residents. Of those who completed the questionnaire, 53.4% were North Dakota residents and 46.6% reside in South Dakota (Figure 1).
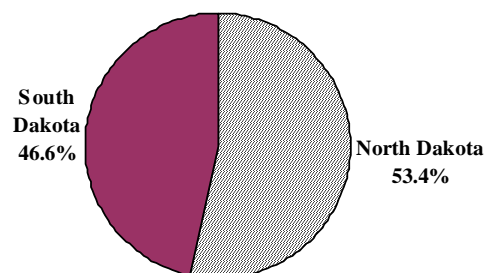

Figure 1: Residence of Survey Respondents

Gender

When the survey was distributed, it was assumed that the gender of the respondents would be representative of cellular users in North and South Dakota. The list purchased from Qwest Dex contained approximately 20% males and 80% females. Responses to the survey indicate similar percentages in the study sample: 24.3% males to 75.6% females, as shown in Figure 2.
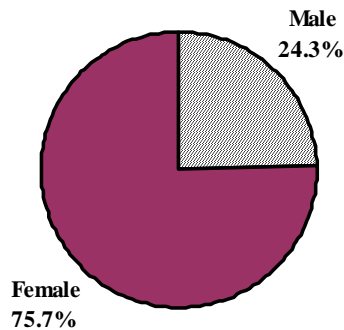
Figure 2: Gender of Survey Respondents

Age

The age breakdown of those who responded to the #SAFE survey is as follows: 12.6% from ages 15 to 24, 52.0% from ages 25 to 44, 29.0% from ages 45 to 64, and 6.4% from those 65 years of age or greater. Figure 3 displays this distribution.
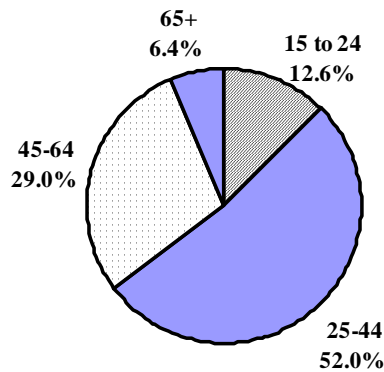
Figure 3: Age of Survey Respondents

Vehicle Type

The vehicle classifications from which survey participants could choose included auto-mobile, commercial vehicle (i.e., truck, bus), motorcycle, RV, or ride as a passenger only. The vast majority of the individuals responding to this survey selected automobile as their primary vehicle on U.S. or Interstate highways in North and South Dakota. Due to the response predictability, this question will be removed from subsequent surveys. The actual breakdown of responses is shown in Figure 4.
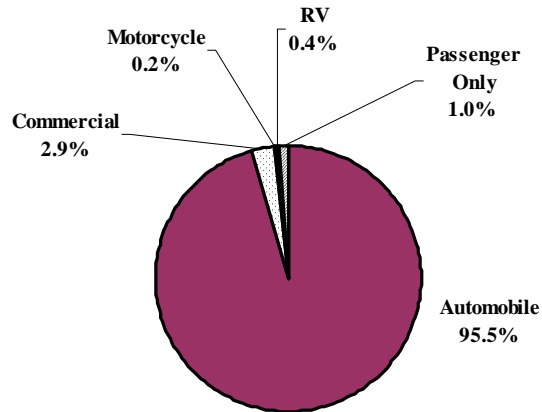
Figure 4: Vehicle Type Normally Driven by Survey Respondents

Trip Purpose

Respondents were asked to choose a category which best describes the purpose of the majority of their vehicle travel on U.S. or Interstate highways in North and South Dakota. The seven categories from which respondents had to choose were work, school, shopping, medical, recreation, visit with family or friends, and other. The results from this question are shown in Figure 5.

Figure 5: Primary Purpose of Vehicle Travel by Survey Respondents

Trip Length

Respondents were asked to estimate the average length of their travel on U.S. or Interstate highways corresponding to the trip purpose selected in the previous question. Due to the 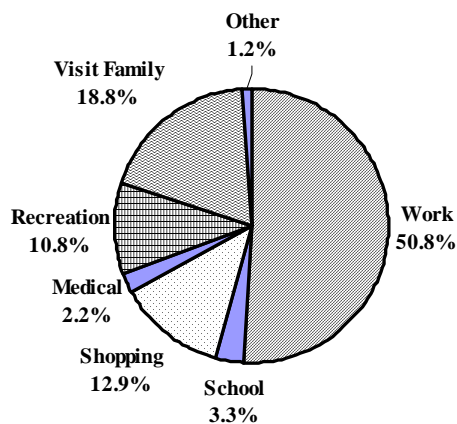rural nature of North and South Dakota, average trip length could be assumed to vary considerably. Data from the survey indicates a relatively even distribution of responses to each of the four trip-length categories. The results from this question are shown in Figure 6.
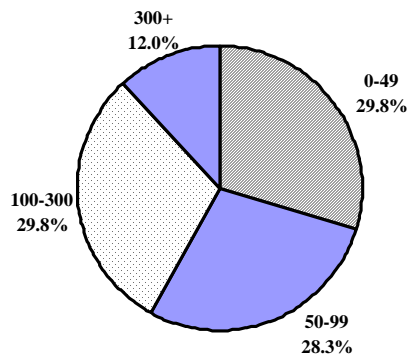
Figure 6: Average Trip Length (in miles) of Survey Respondents

Cellular Telephone Information

Questions regarding system availability, accessibility, and so forth may be related to the type and number of cellular telephones in the study area. Figures 7 and 8 show the distribution of cellular telephone ownership among the survey respondents, as well as their specific cellular carrier(s), respectively. Because the question regarding cellular carriers allowed respondents to check more than one response, the total of the percentages adds to 101.1%. The majority of the respondents (57.3%) used Cellular One as their primary cellular carrier. The second most widely used carrier was Airtouch/Verizon (30.2%).
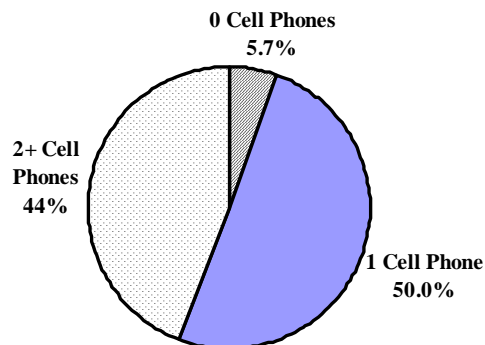
Figure 7: Number of Cellular Telephones Owned by Survey Respondents
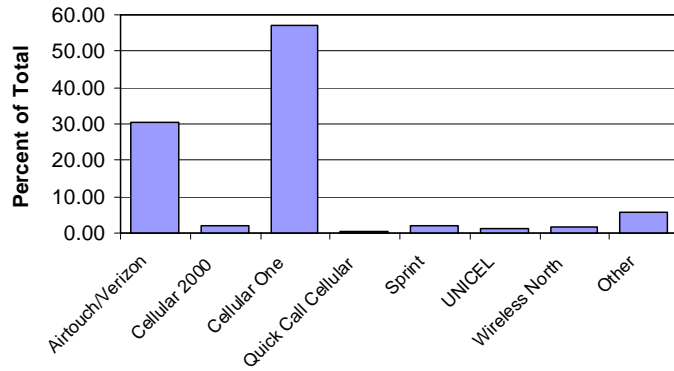
Figure 8: Cellular Telephone Carriers Used by Survey Respondents

Income

The last demographic question included in the survey was related to income. Each survey participant was asked to select from four categories that best described their approximate annual income for their household. Results are shown in Figure 9.
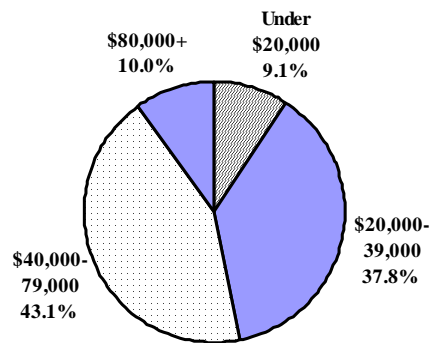
Figure 9: Average Annual Household Income of Survey Respondents

Traveler Characteristics

The first four questions of the survey were asked to gain an overall understanding of travel characteristics in North and South Dakota. These questions were used to determine how often North and South Dakota residents travel on highways, how information is received before or during travel, and the types of information that are most important to travelers. The results of these questions were tallied and a chi-squared analysis was used to determine differences in responses with respect to demographics.

Frequency of Travel

Question 1 asked respondents to estimate how often they travel on U.S. and Interstate highways in North and South Dakota using one of the following categories: times per day, times per week, times per month, or times per year. The question and response choices were stated as follows.

> **1. HOW OFTEN do you travel on U.S. or Interstate highways in North or South Dakota?**
> *(Fill in only one blank)*
>
> _____ times per day
> _____ times per week
> _____ times per month
> _____ times per year

For consistency, all responses to Question 1 were converted into the number of times traveled per year. In the analysis, the results of this question were used as an additional demographic category. The results show that there is considerable variation in the estimated number of times that residents are using U.S. and Interstate highways in North and South Dakota per year. Figure 10 shows that more than 56% of the respondents estimated that they travel on U.S. and Interstate highways 300 times or less per year. Overall, the mean number of times respondents travel on the highway system per year was 470.1.
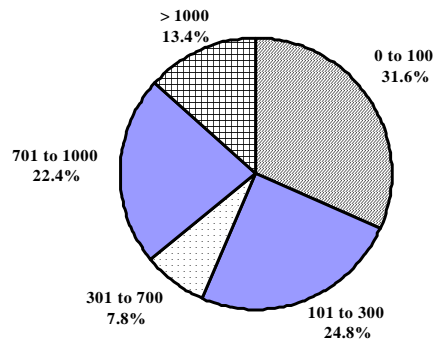
Figure 10: Estimated Frequency of Travel of Survey Participants

From the chi-squared analysis, the estimated frequency of highway use showed differences in responses with respect to gender and trip length. Gender differences showed that females indicated traveling shorter distances than males. As the number of miles traveled increased, the frequency of travel tended to decrease; conversely, as the miles traveled decreased, the frequency of travel tended to increase.

Road & Weather Information Resources Used

This question was asked to gain information about what types of resources are most frequently used by North and South Dakota travelers to determine road conditions and weather forecasts. The format of the question provided a list of potential resources, allowing respondents to choose all resources that apply. The format of the question was as follows.

2. When traveling in North or South Dakota, WHAT RESOURCES do you NORMALLY use to determine road conditions or to hear a weather forecast report? *(Check all that apply)*

- ❑ Television
- ❑ Radio
- ❑ Telephone
- ❑ Highway Advisory Radio
- ❑ #SAFE
- ❑ Internet
- ❑ Observations of Existing Conditions
- ❑ Notices at Truck Stops, Convenience Stores, Rest Areas
- ❑ Communication with Other Drivers
- ❑ Other (please specify)

The resources used most often by travelers were radio (89.2%), television (78.4%), and personal observations of existing conditions (52.2%). These three resources were the only ones that the majority of respondents used to obtain road and weather information. Less than 8 percent (7.6%) indicated using #SAFE as at least one method of obtaining road and weather information. The results of this question are shown in Figure 11.
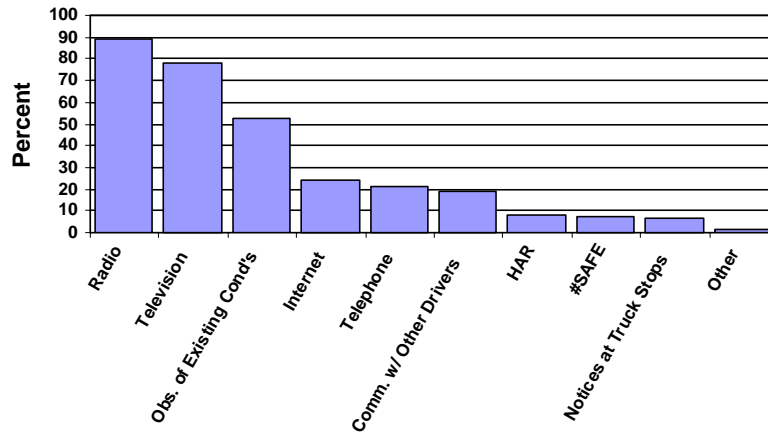
Figure 11: Road Conditions and Weather Information Sources for Survey Respondents

The tests results from the chi-squared analysis showed differences in the Television, Highway Advisory Radio (HAR) and Internet responses with respect to the residence, age and number of cellular telephones. Respondents from South Dakota were slightly more likely to use television as a resource for road and weather conditions. As the age of respondents increased, their likelihood of using Highway Advisory Radio as a resource for road and weather conditions also increased. Conversely, younger respondents were more likely to use the Internet to obtain road and weather information. As the number of cellular telephones increased so did a respondent's likelihood to normally use the Internet as a source of road and weather information.

Importance of Various Types of Information to Travelers

Question 3 asked survey respondents what types of information they would use to alter their travel plans. Respondents were asked to rate each type of information as not important, somewhat important, or very important. Results from this question were used to determine what types of information North and South Dakota travelers are most important for travel considerations. Question 3 was asked using the following format.

3. How IMPORTANT is the following traveler information for determining a change in your travel plans? *(Check only one box for each item)*

	Not Very Important	Somewhat Important	Very Important
a) Road conditions	❏	❏	❏
b) Weather conditions	❏	❏	❏
c) Occurrence of hazard/accident	❏	❏	❏
d) Location of hazard/accident	❏	❏	❏
e) Travel delays	❏	❏	❏
f) Average travel speed	❏	❏	❏
g) Availability of alternate routes	❏	❏	❏
h) Other *(please specify)*	❏	❏	❏

To analyze the ordinal (i.e., scaled) responses, numerical values were assigned to each of the three response categories. The "very important" response was assigned a value of 3, the "somewhat important" response was assigned a value of 2 and the "not very important" response was assigned a value of 1. This is true of all of the scaled responses used in this survey. The mean for each type of information is shown in Table 1.

Type of Information	Mean
Weather Conditions	2.73
Road Conditions	2.72
Alternate Routes	1.99
Location of Hazard	1.93
Travel Delays	1.92
Occurrence of Hazard	1.89
Average Travel Speed	1.85

Table 1: Mean Values for Various Information Types

Based on the mean scores, there were only two types of information that the majority of respondents felt were very important: road conditions and weather conditions. Specifically, nearly 75% of those who answered this question indicated that road conditions and weather conditions were very important.

There were two types of information that respondents specified in the "other" category: 1) construction (12 responses); and 2) the amount of traffic on the road (3 responses). In each instance, the respondent indicated that this type of information (i.e., construction or amount of traffic) was very important for determining a change in travel plans.

The chi-squared analysis indicated relationships between a respondent's residence, gender, age, and amount of vehicle miles traveled; and the level of importance they held for a particular information type. Female respondents indicated a higher importance than males regarding both road and weather condition information. As a respondent's age increased, the level of importance with regard to weather information also increased. North Dakota residents indicated a slightly higher level of importance with regard to information related to the occurrence of hazard, than South Dakota residents did. As the age of respondents increased, so did the level of importance with regard to the occurrence of hazard information. Respondents age 45+ thought travel delay information was more important than respondents between 15 and 24 years of age did, who consecutively thought travel delay information was more important than respondents between 25 and 44 did. As the age of a respondent increased the level of importance with regard to the location of hazards, their average travel speed and information related to the availability of alternate routes also increased. Lastly, as the average number of miles per trip increases, so did the level of importance of alternate route information.

Likelihood of #SAFE Use

The final question concerning travel characteristics was used to determine during what types of road and weather conditions people were most likely to use the #SAFE system. This question was asked using the following scale: not likely, somewhat likely, and very likely. The question and response choices were presented in the following format.

4. HOW LIKELY are you to use the #SAFE system to determine road conditions or hear a weather forecast, during the following conditions? *(Check one box per item)*

	Not Very Likely	Somewhat Likely	Very Likely
a) Clear	❏	❏	❏
b) Cloudy	❏	❏	❏
c) Rainy	❏	❏	❏
d) Snowy	❏	❏	❏
e) Windy	❏	❏	❏
f) Blizzard	❏	❏	❏
g) Daytime	❏	❏	❏
h) Nighttime	❏	❏	❏
i) Other (please specify)_____	❏	❏	❏

Those who selected the "other" category for this question stated tornado (8 responses), ice (7 responses), and fog (4 responses) as alternate responses. Furthermore, the respondents who used the "other" category all stated that the condition they noted would make them very likely to use the #SAFE system (i.e., mean is equal to 3.0). The mean values calculated for the predetermined responses to this question are given in Table 2.

Type of Condition	Mean
Blizzard	2.63
Snowy	2.31
Nighttime	1.90
Windy	1.59
Daytime	1.55
Rainy	1.47
Cloudy	1.22
Clear	1.09

Table 2: Mean Values for Various Weather Conditions

Respondents were most likely to use the #SAFE system during a blizzard (75.9%). Respondents also were very likely to use the #SAFE system during snowy conditions (49%). Since respondents indicated a tendency to use the #SAFE system more during the winter seasons and during winter storm events, this question may be removed from subsequent surveys to make room for more pointed questions regarding #SAFE use.

The chi-squared analysis revealed differences in responses based on age, average number of vehicle miles traveled and number of cellular telephones. As age increased, respondents indicated that they were more likely to use the #SAFE system during cloudy and windy

conditions. Secondly, respondents who indicated traveling longer distances said that they were more likely to use the #SAFE system during a blizzard or snowy conditions than those who indicated traveling shorter distances. Lastly, respondents who indicated that they did not own a cellular telephone, were less likely to use #SAFE during a blizzard.

Willingness to Pay

Question 15 was asked to estimate how much respondents would be willing to pay per call for the #SAFE system. The system is currently free for most cellular telephone users. Thus, respondents were asked how much they would be willing to pay if, in the future, a per-call charge was instituted. The question and response choices were presented as follows.

> **15. For most, #SAFE is currently provided free of charge. If, in the future, there was a cost associated with the #SAFE system, HOW MUCH PER CALL would you be willing to pay to use #SAFE?** *(Check only one box)*
>
> ❑ No charge
> ❑ 10 to 25¢
> ❑ 26 to 50¢
> ❑ 51 to 75¢
> ❑ more than 75¢

The results of this question indicated that 56.3% of the respondents would not be willing to pay to use the #SAFE system and 33.8% would be willing to pay 10 to 25 cents. Only 10% of the respondents indicated they would be willing to spend more than 25 cents to use the #SAFE system in the future. A graphic representation of the results is shown in Figure 12.
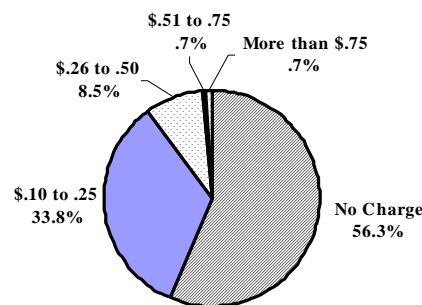

Figure 12: Willingness to Pay

Based on the categorical mean of this question, the estimated cost respondents would be willing to pay, using a weighted average of each of the response categories, is approximately 10 cents. According to the results of the chi-squared analysis, there were no appreciable differences found in the way that respondents answered based on demographic variables.

How Respondents Were Made Aware of #SAFE

This question was asked to determine the primary means through which respondents have been made aware of the #SAFE system. The questions and response choices were presented as follows.

16. How have you been made aware of the #SAFE system? *(Check all that apply)*

- ❑ Radio
- ❑ Cellular Retailer
- ❑ Acquaintance
- ❑ Internet
- ❑ Newspaper
- ❑ Highway Signs
- ❑ Brochure/Flyer
- ❑ This Survey
- ❑ Other _____

The results of this question showed that 76.6% of the respondents were made aware of the #SAFE system by this survey. Theoretically, there should have been a 100% response to this choice, since every respondent who filled out the survey has now been made aware of #SAFE's existence. The next most common means by which respondents became aware of the system was by highway signs (21.6%). Each of the other sources presented in this question were selected by less than 10% of the respondents. Respondents who selected something other than the predetermined categories, listed television as their alternate source of knowledge (3 responses). The results of this question are shown in Figure 13.
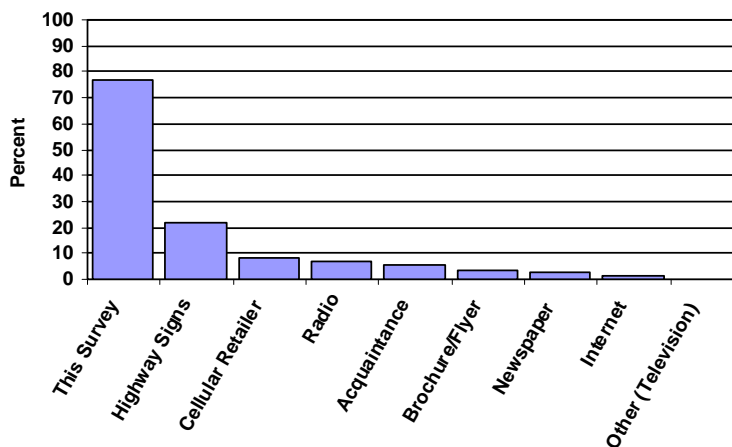
Figure 13: Respondents' Awareness of #SAFE by Various Means

The chi-squared analysis showed differences in how people became aware of the #SAFE system based on their gender, age and number of miles traveled. In general, females were more likely to state that they were made aware of #SAFE through this survey. Males were more likely

to indicate having been made aware of the #SAFE through an acquaintance. It was also revealed that as age and miles traveled increased, respondents were more likely to indicate that they had been made aware of #SAFE by highway signs. However, for those who typically travel 300+ miles per trip, the frequency at which they were made aware of #SAFE through highway signs decreased.

The survey instrument also allowed respondents to provide general comments or suggestions. Many of these comments (approximately 75%) were related to the respondents awareness of #SAFE, saying that they would like to know more about the service. Appendix C provides a list of all the written comments made by respondents.

Functional Measures

The #SAFE system was evaluated with regard to ease of access and clarity of road condition and weather forecast information. Specifically, Questions 8, 10 and 12 were designed to provide insight into these system attributes.

Questions 5, 6 and 7 were asked to gather further information about travelers' use of the #SAFE system. Part of Question 5 was used as a qualifier, while Questions 6 and 7 asked more pointed questions regarding when respondents use #SAFE.

Frequency of #SAFE Use

This question had a twofold purpose. First, it was used to determine the frequency of #SAFE use and, second, as a qualifier to determine whether to answer Questions 6 through 14. The question and response choices were stated as follows.

> **5. HOW OFTEN do you NORMALLY use the #SAFE number to determine road conditions or to hear a weather forecast report?**
>
> ❑ Never use #SAFE
> _____ times per day
> _____ times per week
> _____ times per month
> _____ times per year

Results from this question indicated that 85.6% of those who answered the question reportedly never use #SAFE. Another 15.1% of those who returned the survey did not answer the question at all, which made this the most frequently skipped question on the survey. This relatively high rate of non-response may indicate that those who participated in the survey misunderstood the question, although the wording was not believed to be in any way ambiguous or misleading. To further define the reasons why cellular telephone owners do not use #SAFE to access road condition reports, a more open-ended question needs to be asked on subsequent surveys.

Of the roughly 15 percent who indicated their frequency of use of the #SAFE system, the mean use was 29.6 times per year. This mean was heavily influenced by two respondents who indicated that they use the system once per day and one respondent who indicated using the system twice per day. If those where respondents were excluded from the analysis, the mean would be reduced to 13.6 times per year. The median of the distribution is 5 times per year, indicating that half of those who responded to this part of the question use the system 5 times per year or less and the other half use it 5 times per year or more. Figure 14 shows the percentage of #SAFE system users in each of the following frequency of use categories: 1 to 6, 7 to 12, 13 to 24 and more than 24 times per year.
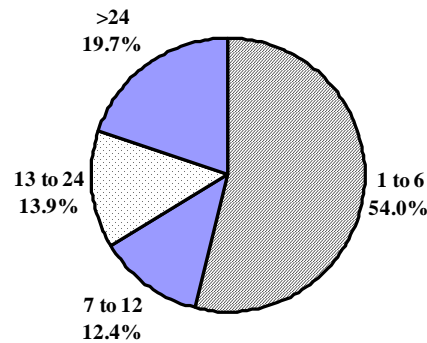
Figure 14: Frequency of #SAFE Use (times per year) by #SAFE Users

The chi-squared analysis indicated that as the number of miles a respondent indicated traveling per trip increased, the more likely they were to use #SAFE.

Once respondents answered Question 5, they were asked a qualifying question regarding whether they have used #SAFE in the past 12 months. The qualifier was stated as follows.

> ***If you haven't used the #SAFE system during the past 12 months please skip to <u>Question 15</u> on the back.***

To accurately assess the accuracy, timeliness and ease of use of the #SAFE system, only those survey respondents who reportedly used the system at least once in the past 12 months were asked to evaluate the #SAFE system.

Use of #SAFE Before or During a Trip

Question 6 was asked to identify whether #SAFE users typically dial into #SAFE before or after they leave on a trip. Question 6 was presented as follows.

> **6. Do you TYPICALLY use #SAFE to access road conditions of hear a weather forecast report…**
> - ❑ Before you start a trip?
> - ❑ While on the road?
> - ❑ Both
> - ❑ Neither

Responses to Question 6 show that most users access #SAFE while on the road, although nearly as many respondents indicated that they use the system <u>both</u> before they begin their trip and while on the road. The minority indicated that they use #SAFE neither before nor during a trip. One hundred thirty-six individuals responded to this question. Figure 15 shows the categorical responses and their associated frequencies to Question 6.
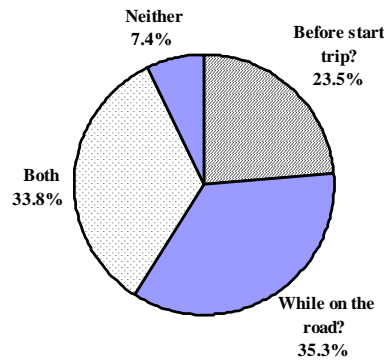
Figure 15: Use of #SAFE Before or During a Trip

Seasonal Use of #SAFE

Question 7 was asked to identify during which season(s) the #SAFE system is used most often. Question 7 was presented as follows.

7. During which SEASON(S) do you MOSTLY use the #SAFE system?
   (Check all that apply)
   - ❑ Spring
   - ❑ Summer
   - ❑ Fall
   - ❑ Winter

Responses to Question 7 indicate that most #SAFE users utilize the system during the winter, with <u>98.5%</u> of the 132 who answered this question indicating that winter was at least one of the seasons in which they use #SAFE most often. Over 70% indicated that they use the system <u>only</u> during the winter, 6.8% reportedly use it <u>only</u> during fall and winter, 3.0% use it during all seasons, and the remaining 19.7% indicated various combinations of seasons (most of which included winter). Figure 16 shows #SAFE use by season.

Figure 16: #SAFE Use by Season

#SAFE Availability

Question 8 was designed to collect qualitative data regarding #SAFE system availability. This is an important question because system use is often related to its availability. Responses to this question included both an ordinal scale and a "don't recall" option. The "don't recall" response was not assigne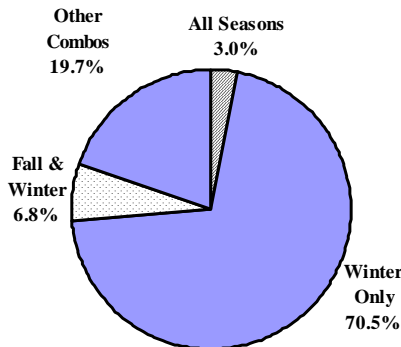d a numerical value because it is not part of the three rated responses. Mean values are based on the numerical values, as described previously. Question 8 was presented as follows.

8. When trying to access the #SAFE system, HOW AVAILABLE is it?
- ❑ Very Available
- ❑ Somewhat Available
- ❑ Not Very Available
- ❑ Don't Recall

Out of the 134 responses to this question, 14 (10.4%) indicated that they couldn't recall the availability of the #SAFE system. The mean, determined from the 120 remaining scaled responses, was 2.47. The chi-squared analysis indicated that there were no differences in the responses to this question with regard to the various demographic questions.

#SAFE Timeliness

Question 9 was asked to assess #SAFE users' impressions of the timeliness of the road condition reports and weather forecast information. This information is critical because the likelihood of a particular #SAFE caller reusing the system after receiving less-than accurate information is assumed to be reduced dramatically. A previous estimate is that one false message does more harm to the trustworthiness of the information provided than the good done by 10 accurate messages.[1] Question 9 and its response categories were stated as follows.

9. HOW TIMELY are #SAFE road condition reports and weather forecasts?
- ❑ Very Timely
- ❑ Somewhat Timely
- ❑ Not Very Timely
- ❑ Don't recall

Results from this question indicated that out of the 132 responses to this question, 14 (10.6%) indicated that they couldn't recall the timeliness of the #SAFE system. The mean, determined from the 118 remaining responses, was 2.31. The chi-squared analysis indicated that there were no differences in the responses to this question with respect to the various demographic questions.

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[1] Kantowitz, Barry H.; Hanowski, Richard J.; and Kantowitz, Susan C. "Driver Acceptance of Unreliable Traffic Information in Familiar and Unfamiliar Settings." *Human Factors*, Vol. 39, June 1997, pp. 164-76.

#SAFE Understandability

This question was asked to assess #SAFE users' impressions of the overall understandability of the road condition reports and weather forecast information. Understandability is important because messages delivered to the system user may contain information that will potentially deter travel during inclement conditions. Question 10 and its response options were stated as follows.

10. HOW EASY are the #SAFE road condition reports and weather forecasts to understand?

    ❑   Very Easy
    ❑   Somewhat Easy
    ❑   Not Very Easy
    ❑   Don't Recall

Results from this question indicated that out of the 135 responses to this question, 7 (5.2%) indicated that they couldn't recall how easy #SAFE road condition reports and weather forecasts were to understand. The mean, determined from the 128 remaining responses, was 2.66. The chi-squared analysis indicated that there were no differences in the responses to this question with respect to the various demographic questions.

#SAFE Accuracy

This question was asked to assess #SAFE users' impression of the accuracy of the road condition reports and weather forecasts provided by the #SAFE system. Keep in mind that results from this question cannot be directly linked to the actual accuracy of the information because it only takes into account each user's <u>impression</u> of its accuracy. To determine true accuracy, comparisons between real-time road and weather conditions and #SAFE reported conditions would have to be made. This fact, however, does not diminish the importance of this question in that the user must trust the information being distributed by the system to ensure #SAFE's future use. Like timeliness, accuracy is important to attracting and maintaining repeat system users. Question 11 and its response options were stated as follows.

11. HOW ACCURATE are the #SAFE road condition reports and weather forecasts?

    ❑   Very Accurate
    ❑   Somewhat Accurate
    ❑   Not Very Accurate
    ❑   Don't Recall

Results from this question indicated that out of the 133 responses to this question, 7 (5.3%) indicated that they couldn't recall the accuracy of #SAFE road condition reports and weather forecasts. The mean, determined from the 126 remaining responses, was 2.31. The chi-squared analysis indicated that there were no differences in the responses to this question with respect to the various demographic questions.

#SAFE Ease-of-Use

This question was asked to assess how easy it is to follow the questions/options for each of the #SAFE menus. The #SAFE system currently asks four questions to determine the location and direction of the traveler. The first question is related to the highway the traveler is currently using, the second question is related to the state in which the traveler is currently located, the third question is related to the direction of the traveler's vehicle, and the fourth question is related to the mile marker or exit nearest the traveler. This survey question is important because it attempts to determine deficiencies in the #SAFE system's ability to gather the necessary location/direction information. Confusion regarding the #SAFE menu may deter many from using the #SAFE system again or cause them to make an incorrect entry which, in turn, may result in a false road condition and forecast report. Question 12 of the #SAFE survey was stated as follows.

12. When using the #SAFE menus, HOW EASY are the following menu questions/options to follow?

	Not Very Easy	Somewhat Easy	Very Easy	Don't Recall
a) Question regarding what highway you are on?	❑	❑	❑	❑
b) Question regarding what State you are traveling in?	❑	❑	❑	❑
c) Question regarding your direction of travel?	❑	❑	❑	❑
d) Question regarding what mile marker/exit you are near?	❑	❑	❑	❑

The results of Question *a)* indicated that out of the 135 responses to this question, 12 (8.9%) stated that they couldn't recall how easy the question regarding what highway they were on was to follow. The mean for Question *a)*, determined from the remaining 123 responses, was 2.52. Out of the 135 responses to Question *b)*, 9 indicated that they couldn't recall how easy the question regarding what state they were traveling in was to follow. The mean for Question *b)*, determined from the remaining 126 responses, was 2.69. Out of the 135 responses to Question *c)*, 13 (9.8%) indicated that they couldn't recall how easy the question regarding what direction they were traveling was to follow. The mean for question *c)*, determined from the remaining 122 responses, was 2.55. Out of the 135 responses to Question *d)*, 19 (14.2%) indicated that they couldn't recall how easy the question regarding what mile marker/exit they were near was to follow. The mean for Question *d)*, determined from the remaining 116 responses, was 2.35.

Potential Affect on Travel Plans

This question was asked to assess #SAFE users' impressions of how likely it was that the road condition reports and weather forecasts provided by the #SAFE system would affect their travel plans. This question cannot be tied directly to travel behavior, but can provide an understanding of the likelihood of such actions. Therefore, to accurately measure the affect that traveler information has on individual travel decisions, a separate study would need to be conducted. Question 13 of the #SAFE survey was stated as follows.

13. HOW LIKELY are #SAFE road condition reports and weather forecasts to affect your travel plans?

- ❑ Very Likely
- ❑ Somewhat Likely
- ❑ Not Very Likely

Responses to this question resulted in a mean of 2.36. This numerical average indicates that travelers who use #SAFE as a means of determining road condition and weather forecast information may in fact be likely to alter their travel behavior as a result of the information received.

It should be noted, however, that when speculative or hypothetical questions such as this one are asked, responses tend to be biased positively or favorably with regard to the topic under study. In survey research, this phenomenon is typically referred to as socially desirable responses. To determine real travel behavior changes, a question regarding the actual frequency or extent of travel changes in a given time period would need to be asked. Furthermore, due to the number of sources for road and weather information, determining the unique or combined effect #SAFE information on a particular traveler's plans is complicated. The chi-squared analysis showed that there were no differences in the responses with respect to the various demographic questions.

Overall Usefulness of #SAFE

This question was asked to determine the overall impression of the usefulness of #SAFE. The question was stated as follows.

14. Overall, HOW USEFUL are #SAFE road condition reports and weather forecasts?

- ❑ Very Useful
- ❑ Somewhat Useful
- ❑ Not Very Useful

Results from this question rated the usefulness of #SAFE road condition reports and weather forecasts positively. Out of the 136 responses to this question, 95 (69.9%) said that #SAFE was very useful, 40 (29.4%) said it was somewhat useful and 1 (0.7%) said it was not useful. The mean calculated from these 136 responses is 2.69. Results from Question 14 cannot be used to predict use of the #SAFE system, in that the question is designed solely to provide an estimate of the user's assessment of #SAFE usefulness. The chi-squared analysis showed that there were no differences in the responses with respect to the various demographic questions.

Summary

The specific objectives of the survey were to assess system accuracy, system functionality and system effectiveness, as well as to determine users' willingness to pay and #SAFE awareness. Results from each of the questions provide helpful insight into each of these categories.

Accuracy of the information conveyed via #SAFE is extremely important to maintaining repeated users. Two questions were used to identify overall accuracy of the #SAFE system. Question 9 asked survey participants to qualitatively assess the timeliness of the information received from #SAFE. The mean for this question was 2.31. Question 11 asked survey participants to qualitatively assess the accuracy of the information received from #SAFE. The mean for this question was also 2.31. The equality of the two means shows that there is consensus on the overall accuracy and timeliness of #SAFE road condition reports and weather forecast information.

System functionality also is important because a dysfunctional system will not allow participants to understand or receive the proper information. Three questions were asked to identify #SAFE functionality. Question 8 asked survey participants to qualitatively assess the availability #SAFE if they had used the system at least once in the past 12 months. The mean for this question was 2.47, which represents a favorable assessment of system availability. Question 10 asked survey participants to qualitatively assess how easy the #SAFE information is to understand. The mean for this question was 2.66. Question 12 asked how easy each of the four menus used to get location, and direction of travel information from the user are to understand and follow. The mean values for these four menu-based questions were 2.52, 2.69, 2.54 and 2.35, respectively. Overall, the means for these questions suggests that #SAFE does in fact provide a functional service to the user.

The system also must have the potential to affect driver behavior or travel plans, as opposed to simply providing neutral information. Two questions were asked to assess #SAFE effectiveness. Question 13 asked how likely survey participants would be to change their travel plans based on information from #SAFE road condition reports and weather forecasts. The mean for this question was 2.36. Question 14 asked how useful #SAFE road condition reports and weather forecasts are overall. The mean for this question was 2.69. The difference between the means of these questions suggests that some people find the information useful, but not sufficient to alter their travel plans.

Finally, survey participants were asked to estimate how much they would be willing to pay for the #SAFE service. Analyzing the responses from Question 15 resulted in an average price of $.10 per call. Survey participants also were asked how they had become aware of #SAFE. Results from this question indicate that many people were unaware of #SAFE before this survey and most of the other respondents learned of the service through highway signs.

Appendix A – Survey Instrument and Descriptive Statistics

1 **HOW OFTEN do you travel on U.S. or Interstate highways in North or South Dakota?**
(Fill in only one blank)
_____ times per day
_____ times per week   **Mean= 470 times per year**
_____ times per month
_____ times per year

2 **When traveling in North or South Dakota, WHAT RESOURCES do you NORMALLY use to determine road conditions or to hear a weather forecast report?** *(Check all that apply)*

❑ Television	78.4%	❑ Internet	24.0%
❑ Radio	89.2%	❑ Observations of Existing Conditions	52.2%
❑ Telephone	21.0%	❑ Notices at Truck Stops, Convenience Stores,	
❑ Highway Advisory		Rest Areas	6.21%
Radio	8.2%	❑ Communication with Other Drivers	19.2%
❑ #SAFE	7.6%	❑ Other (please specify) *See Table A1*	1.2%

3 **How IMPORTANT is the following traveler information for determining a change in your travel plans?** *(Check only one box for each item)*

	Not Very Important	Somewhat Important	Very Important	Mean
a) Road conditions	1	2	3	2.72
b) Weather conditions	1	2	3	2.73
c) Occurrence of hazard/accident	1	2	3	1.89
d) Location of hazard/accident	1	2	3	1.93
e) Travel delays	1	2	3	1.92
f) Average travel speed	1	2	3	1.85
g) Availability of alternate routes	1	2	3	1.99
h) Other (please specify) *See Table A2*	1	2	3	3

4 **HOW LIKELY are you to use the #SAFE system to determine road conditions or hear a weather forecast report, during the following conditions?** *(Check one box per item)*

	Not Very Likely	Somewhat Likely	Very Likely	Mean
a) Clear	1	2	3	1.09
b) Cloudy	1	2	3	1.22
c) Rainy	1	2	3	1.47
d) Snowy	1	2	3	2.31
e) Windy	1	2	3	1.59
f) Blizzard	1	2	3	2.63
g) Daytime	1	2	3	1.54
h) Nighttime	1	2	3	1.91
i) Other (please specify) *See Table A3*	1	2	3	3

5 **HOW OFTEN do you NORMALLY use the #SAFE number to determine road conditions or to hear a weather forecast report?** *(Fill in only one blank)*

❑ Never use #SAFE
_____ times per day   **Mean= 3.6 times per year for ALL those surveyed**
_____ times per week   **(includes those who never use #SAFE)**
_____ times per month
_____ times per year   **Mean= 29.6 times per year of those who indicated using #SAFE.**

If you haven't used the #SAFE system during the past 12 months please skip to Question 15 on the back.

• •

6 **Do you TYPICALLY use #SAFE to access road conditions or hear a weather forecast report…**
- ❏ Before you start a trip? **23.5%**
- ❏ While on the road? **35.3%**
- ❏ Both **33.8%**
- ❏ Neither **7.4%**

8 **When trying to access the #SAFE system, HOW AVAILABLE is it?**
- ❏ 3.Very Available
- ❏ 2.Somewhat Available   **Mean= 2.47**
- ❏ 1.Not Very Available
- ❏ Don't Recall **10.0%**

10 **HOW EASY are #SAFE road condition reports and weather forecasts to understand?**
- ❏ 3.Very Easy
- ❏ 2.Somewhat Easy   **Mean= 2.66**
- ❏ 1.Not Very Easy
- ❏ Don't Recall **5.2%**

7 **During which SEASON(S) do you MOSTLY use the #SAFE system?** *(Check all that apply)*
- ❏ Spring **13.6%**
- ❏ Summer **12.9%**
- ❏ Fall **14.4%**
- ❏ Winter **98.5%**

9 **HOW TIMELY are #SAFE road condition reports and weather forecasts?**
- ❏ 3.Very Timely
- ❏ 2.Somewhat Timely   **Mean= 2.31**
- ❏ 1.Not Very Timely
- ❏ Don't Recall **11.0%**

11 **HOW ACCURATE are #SAFE road condition reports and weather forecasts?**
- ❏ 3.Very Accurate
- ❏ 2.Somewhat Accurate   **Mean= 2.31**
- ❏ 1.Not Very Accurate
- ❏ Don't Recall **5.3%**

12 **When using the #SAFE menus, HOW EASY are the following menu questions/options to follow?**

	Not Very Easy	Somewhat Easy	Very Easy	Don't Recall	Mean
a) Question regarding what highway you are on?	1	2	3	9.0%	2.52
b) Question regarding what State you are traveling in?	1	2	3	6.7%	2.69
c) Question regarding your direction of travel?	1	2	3	9.8%	2.54
d) Question regarding what mile marker/exit you are near?	1	2	3	14.2%	2.35

13 **HOW LIKELY are #SAFE road condition reports and weather forecasts to affect your travel plans?**
- ❏ 3.Very Likely
- ❏ 2.Somewhat Likely   **Mean= 2.36**
- ❏ 1.Not Very Likely

14 **Overall, HOW USEFUL are #SAFE road condition reports and weather forecasts?**
- ❏ 3.Very Useful
- ❏ 2.Somewhat Useful   **Mean= 2.69**
- ❏ 1.Not Very Useful

15 **For most, #SAFE is currently provided free of charge. If, in the future, there was a cost associated with the #SAFE system, HOW MUCH PER CALL would you be willing to pay to use #SAFE?** *(Check only one box)*
- ❏ No charge **56.3%**
- ❏ 10 to 25¢ **33.8%**
- ❏ 26 to 50¢ **8.5%**
- ❏ 51 to 75¢ **0.7%**
- ❏ more than 75¢ **0.7%**

16 **How have you been made aware of the #SAFE system?** *(Check all that apply)*
- ❏ Radio **7.1%**
- ❏ Cellular Retailer **8.0%**
- ❏ Acquaintance **5.3%**
- ❏ Internet **1.3%**
- ❏ Newspaper **2.5%**
- ❏ Highway Signs **21.6%**
- ❏ Brochure/Flyer **3.2%**
- ❏ This Survey **76.6%**
- ❏ Other *Television* **0.3%**

17 The following information is needed to ensure that your responses are properly represented in this survey. It will be used for the purposes of this survey ONLY. *(Check only one box per question)*

		Percent
a) What is your current state of residence?	❑ North Dakota	53.4
	❑ South Dakota	46.6
b) What is your gender?	❑ Male	24.3
	❑ Female	75.7
c) What is your age?	❑ 15 – 24 Years	12.6
	❑ 25 – 44	52.0
	❑ 45 – 64	29.0
	❑ 65 +	6.4
d) What type of vehicle do you NORMALLY drive on U.S. or Interstate highways in North or South Dakota?	❑ Automobile	95.5
	❑ Commercial (Truck, Bus)	2.9
	❑ Motorcycle	0.2
	❑ RV	0.4
	❑ Ride as Passenger Only	1.0
e) What is the PRIMARY PURPOSE for the majority of your vehicle travel on U.S. or Interstate highways in North or South Dakota?	❑ Work	50.8
	❑ School	3.3
	❑ Shopping	12.9
	❑ Medical	2.2
	❑ Recreation	10.8
	❑ Visit Family or Friends	18.8
	❑ Other *Unspecified*	1.2
f) What is the AVERAGE number of miles traveled for the trip purpose checked above?	❑ 0 – 49	29.8
	❑ 50 – 99	28.3
	❑ 100 – 300	29.8
	❑ 300 +	12.0
g) How many cellular telephones do you have in your household?	❑ 0	5.7
	❑ 1	50.0
	❑ 2 or more	44.3
h) Please identify the cellular carrier(s) you use for the cellular telephone(s) in your household. *(Check all that apply)*	❑ Airtouch/Verizon	30.2
	❑ Cellular 2000	2.1
	❑ Cellular One	57.3
	❑ Quick Call Cellular	0.3
	❑ Sprint	2.1
	❑ UNICEL	1.1
	❑ Wireless North	1.6
	❑ Other *See Table A4*	5.9
i) What is your approximate annual household income?	❑ Under $20,000	9.1
	❑ 20,000 – 39,000	37.8
	❑ 40,000 – 79,000	43.1
	❑ 80,000 +	10.0

Table A1: Others for Question 2

Others	Count
Newspaper	3
Sheriff's Office	2
CB Radio	2
DTN	3
National Weather Service	1
AAA	1
ND DOT	1

Table A2: Others for Question 3

Others	Count
Amount of Traffic	3
Construction	12

Table A3: Others for Question 4

Others	Count
Ice	7
Tornado	8
Fog	4

Table A4: Others for Question 17h

Others	Count
AT&T	5
Bell South	1
Commnet	23
GTE Wireless	1
Horizon	1
Ionex	2
MCI Worldcom	2
MTS	1
Nextel	1
Trackphone	1
Unspecified	26
Voice Stream	1
Western Wireless	1

Appendix B – Table of Chi-Squared Comparisons

Table B1: Chi-squared Comparisons Included in the Analysis

Demographic columns:

1. Highway Use
5. #SAFE Use/Year
6. #SAFE Before/During
7. Season = Spring
7. Season = Summer
7. Season = Fall
7. Season = Winter
17a. Residence
17b. Gender
17c. Age
17d. Vehicle Type
17e. Trip Purpose
17f. Vehicle Miles Traveled
17g. # of Cell Phones
17h. Cellular Carrier
17i. Household Income

Information (rows):

1. Highway Use
2. Source = TV
2. Source = Radio
2. Source = Telephone
2. Source = HAR
2. Source = #SAFE
2. Source = Internet
2. Source = Observation
2. Source = Public Notices
2. Source = Other Drivers
3a. Road Conditions
3b. Weather Conditions
3c. Occurrence of hazard
3d. Location of hazard
3e. Travel Delays
3f. Average travel speed
3g. Alternate routes
4a. Condition = Clear
4b. Condition = Cloudy
4c. Condition = Rainy
4d. Condition = Snowy
4e. Condition = Windy
4f. Condition = Blizzard
4g. Condition = Daytime
4h. Condition = Nighttime
5. Never use #SAFE
5. #SAFE Use/Year
6. #SAFE before or during trip
7. Season = Spring
7. Season = Summer
7. Season = Fall
7. Season = Winter
8. #SAFE Availability
8. Don't Recall Availability
9. #SAFE Timeliness
9. Don't Recall Timeliness
10. #SAFE Understandability
10. Don't Recall Understandability
11. #SAFE Accuracy
11. Don't Recall Accuracy
12a. Highway menu option ease
12a. Don't Recall Highway menu ease
12b. State menu option ease
12b. Don't Recall state menu ease
12c. Direction menu option ease
12c. Don't Recall Direction menu ease
12d. Mile-marker menu option ease
12d. Don't Recall mile-marker menu ease
13. Likelihood of affect on travel plans
14. #SAFE Usefulness
15. Willingness to Pay
16. Awareness = Radio
16. Awareness = Cellular Retailer
16. Awareness = Acquaintance
16. Awareness = Internet
16. Awareness = Newspaper
16. Awareness = Highway Signs
16. Awareness = Brochure/Flyer
16. Awareness = This Survey

Legend:
- (Gray) Chi-squared Analysis Passed
- (X) Chi-squared Analysis Invalid
- (White) No Chi-squared Analysis
- (Black) Chi-squared Differences Found

Appendix C – Comments from Survey Participants

- #SAFE needs some marketing. This is the first I've heard of it. Cell user for 8 years.
- #SAFE sounds interesting. It would be nice to have reliable road/weather info.
- #SAFE sounds like a wonderful public service, if only the public knew about it.
- Cell phones are the best things ever invented
- Communications is vital. Thanks for pursuing this.
- Did not know that it existed
- Have more highway signs with the phone number
- How do you use #SAFE?
- I am a single traveler and would like a number to call
- I am a State Trooper.
- I am not familiar with #SAFE.
- I appreciate this service. In the winter, it could be advertised more.
- I did not know about # SAFE until this
- I didn't know about #SAFE, I would love to have more info. It would be helpful.
- I have never heard of this. You need more advertisement.
- I have never heard of #SAFE before.
- I have never heard of #SAFE, I would be interested in more info.
- I have never heard of this before.
- I have never heard this referred to as #SAFE. The ND signs say #7233.
- I have never used #SAFE but I might use it now that I know about it.
- I have not called #SAFE in a while.
- I have not heard of #SAFE. I would be interested in learning more.
- I have not heard of this before and would like more info.
- I have not used the system I am not opposed to it though if good information on it
- I never knew the #SAFE existed until this survey.
- I think our dealers should tell people about this.
- I think that #SAFE is a good idea, but numbers would be easier to use.
- I think this should be advertised more. I was not aware of #SAFE but I am now.
- I was not aware of #SAFE and am glad to hear of it.
- I was not aware of #SAFE.
- I was not aware of the system. If I knew of it, I would have used it. I will now
- I was not aware of this until this survey.
- I wasn't aware of #SAFE, I would appreciate some more information.
- I will use this in the future.
- I would be willing to try #SAFE

- I would like more info o the #SAFE system.
- I would like more information on #SAFE. It only takes once for it to pay off.
- I would like more information on the #SAFE system.
- I would like to have info on #SAFE for me and my husband
- I would like to receive more information about #SAFE.
- I would use #SAFE if I had known about it.
- I would use this had I known about it.
- If I did have a cell phone, #SAFE would be nice to have access to on the road.
- If weather and road conditions are not good, I do not travel in winter.
- It is not always easy to find your mile marker and exit.
- It would have been nice had our cellular company made us aware of this.
- I've never heard of #SAFE. I do not remember any media coverage of it.
- I've never heard of it. It sounds like a good thing that people should know about
- I've seen the highway signs for years, but until now did not realize what #SAFE
- More extensive promotion of #SAFE. I did not know that it existed in this area.
- Most highway reports are not accurate or up to date.
- Need more information on #SAFE before I would use the service.
- Need to get #SAFE out to the public more. Like maybe on cell phone bills.
- Never heard of #SAFE before, but I will use it now.
- Never heard of it before
- Please make the information about #SAFE more noticeable through advertising
- Please take my name off your mailing list.
- Should have more information on what #SAFE is and a number to call to try it
- Sounds like a good service. Is it available here now?
- Still do not know what #SAFE system is.
- Thank You #SAFE Good Program
- Thank you for asking people's opinions, I think its great.
- Thanks for informing me about #SAFE, I will use it now.
- The updates are not very current. They were not updated within last 2 hours
- There needs to be more publicity on this service.
- This is a wonderful survey. I enjoyed filling it out. Thanks
- This is the first I have heard about #SAFE
- This is the first I have heard if it. I would like to know more about it.
- Up to this point, we were unaware of this program, but we will try it.
- Was not aware of #SAFE until this survey
- We no longer own a cell phone.
- Weather/Road conditions are very important to people in western SD.

- What is #SAFE?
- What is #SAFE?
- What is #SAFE?
- What our income is should not have any bearing on this survey.
- Wish there was more information on #SAFE, and how to use it, etc.…
- Would like to learn more about the #SAFE program
- You might want to find ways to publicize #SAFE better.
- You should talk about using #SAFE on the local news and radio