

**Department of Transportation
Office of the Chief Information Officer**

**SUPPORTING STATEMENT
Driver and Carrier Surveys Related to Electronic On-Board Recorders (EOBRs), and
Potential Harassment Deriving from EOBR Use**

Part B. Collections of Information Employing Statistical Methods.

1. DESCRIBE POTENTIAL RESPONDENT UNIVERSE AND ANY SAMPLING SELECTION METHOD TO BE USED.

The proposed data collection is aimed at studying both level and pattern of use for the electronic on-board recorders (EOBRs) by commercial motor vehicle (CMV) carriers, and at understanding whether the use of such devices may be associated with driver harassment. To fairly represent both drivers and carriers, the data collection must involve both sides. FMCSA’s study team believes that a mail survey of carriers and an in-person interview survey of drivers will provide the necessary information to assess whether or not EOBRs lead to driver harassment. Currently, FMCSA estimates that there are 550,000 active interstate motor carrier companies in the U.S and approximately 5 million drivers with a commercial driver’s license.

1a. Carrier survey

The estimate for the number of carriers is based on the Motor Carrier Management Information System (MCMIS) Census File compiled by the FMCSA. This file contains the basic business information (USDOT number, mailing and physical address), operations information (types of cargo and materials transported), and the business size (number of vehicles, number of interstate and intra-state drivers). The eligibility criteria for the proposed data collection are:

1. Cargo transportation (motor coach businesses are not eligible)
2. Entity type: carriers (brokers, shippers and IEPs are not eligible)

The frame information will be used for stratification purpose as summarized in Table B1.

Table B1. Frame information for carrier survey.

Sample size / frame count	Interstate cargo carrier	HM Interstate carrier	Intrastate carrier	Total
Fleet size 1000+	228/228	2/2	0/44	230/274
Fleet size 200–999	1,303/1,303	17/17	0/85	1,320/1,405
Fleet size 50–199	2,582/5,955	68/157	0/788	2,650/6,900
Fleet size 1–49	0/542,200	0/17,233	0/509,853	0/1,069,286
Total	4,113/549,686	87/17,409	0/510,770	4,200/1,077,865

Source: MCMIS census data file; record selection criteria are: mailing and physical addresses are not labeled undeliverable; entity type is carrier; passenger only operations are excluded.

The existing evidence suggests a low incidence rate of EOBR use. The 2011 Road Check conducted by Commercial Vehicle Safety Alliance estimated that 14% of drivers used electronic logs (information on the specific type of EOBR was not collected). In its legal brief, the Owner-Operator Independent Drivers Association (OOIDA) cites an FMCSA statement that “more than 400,000 EOBRs are in use today.” FMCSA believes that EOBRs are predominantly used by large carriers, who face greater logistical challenges than smaller carriers, and have greater incentives to make their records electronically available for their internal use. In fact, according to the existing frame information, the 10 largest carriers have 455,000 total vehicles (although the frame does not distinguish between the long haul trucks and other types of vehicles; e.g., most USPS or FedEx vehicles are much smaller delivery trucks), and 40 largest carriers have 820,000 total vehicles, which is 14% of the total number of vehicles on the frame. Hence our sampling strategy is aimed at reaching all of the large carriers, and 43% of the medium size carriers (50-200 vehicles). Combined, these large and medium carriers comprise 1.4% of the entries of the MCMIS frame, but they operate about 52% of the vehicles. Carriers with fewer than 50 power units will not be sampled, as FMCSA does not expect that EOBR incidence in this group to be high enough to yield any EOBRs in the sample. This proposed sampling method can be viewed as a relaxation of cutoff sampling that is frequently used in establishment surveys¹. Also, the intrastate carriers will not be sampled, as the HOS regulations of the 11-hour driving limit may not be relevant for them, since most within-state deliveries will take less than 11 hours. Out of 4200 sampled units, 200 will receive the pilot study mailing, and the remaining 4000 will receive the main survey instrument/questionnaire.

For establishment surveys, the literature records that the response rate can range from the low of 20-30% (generic mail addressed to the owner or manager of the business) to a high of 85-90%, as achieved in some US Census Bureau mandatory response surveys.² The survey instrument developed for the motor carrier survey will be used in a pilot study in order to assess the likely response rate for the full survey. While the subcontractor, Abt SRBI, has conducted research with freight shippers in the past, the methodologies employed in those studies were different (telephone recruit) and achieved higher participation rates (90%) among qualified companies than what is expected for this research study. In contrast, the importance of the current research topic to carriers will also have an effect on their willingness to participate in the survey. The sample sizes released to the field will be: pilot study, $n = 200$; main mailing, $n = 4,000$. We are assuming a response rate of 10%. The pilot study will inform us as to what response rate can be ultimately expected from the main mailing. Given the assumed response rate of 10%, the FMCSA research team expects to have 20 completed surveys in the pilot study and 400 in the main survey.

¹ Yorgasson, D. Bridgman, B., Cheng, Y., Dorfman, A. H., Lent, J., Liu, Y.K, Miranda, J., and Rumburg, S. (2011) Cutoff Sampling in Federal Surveys: An Inter-Agency Review. Proceedings of the Section on Government Statistics, American Statistical Association, Alexandria, VA. Available from <http://www.bls.gov/osmr/pdf/st110050.pdf>.

Knaub, J.R., Jr. (2008), “Cutoff Sampling.” In *Encyclopedia of Survey Research Methods*, Editor: Paul J. Lavrakas, SAGE Publications.

Sigman, R. S. and Monsour, N. J. (1995) Selecting Samples from List Frames of Businesses, in *Business Survey Methods* (eds B. G. Cox, D. A. Binder, B. N. Chinnappa, A. Christianson, M. J. Colledge and P. S. Kott), John Wiley & Sons, Inc., Hoboken, NJ, USA. doi: 10.1002/9781118150504.ch8.

² Cox, B.G., Binder, D.A., Chinnappa, B.N., Christianson, A., Colledge, M.J., and Kott, P.S. (1995). *Business Survey Methods*. Wiley, New York.

1b. Truck driver survey

There are no existing comprehensive lists or data bases for the CMV drivers that can be used to construct a list frame to draw a probability sample. Given that the CMV drivers represent a small fraction of the adult population, traditional mail or phone surveys would involve costly screening procedures, and it will be difficult to implement them effectively as the CMV drivers tend to be away from their nominal residential addresses for a greater fraction of their time than that of an average respondent. For these reasons, FMCSA proposes to sample the truck drivers in their work environment by intercepting them at truck stops. This method ensures eligibility of the study participants, and the in-person interview format will likely yield higher response rate than what is typical in phone interview surveys. Other potential intercept locations, such as weigh stations, are bypassed by the trucks that use the PrePass system, and the incidence of this system potentially correlates with the use of EOBRs, in that EOBR users are more likely to be PrePass users. Therefore, intercepting the drivers at the weigh stations would most likely yield a biased representation of the universe of EOBR users.

The frame developed by Abt SRBI³ of the intercept points consists of 6168 truck stops in the United States. A subset of truck stops within 20 miles from a metro area with population of 500,000 or more was identified from this universe, with a twofold motivation: first, proximity to large cities will serve as a proxy for traffic across the site; second, the interviewer team travel costs can be minimized if difficult to reach sites are excluded. Furthermore, this subset of truck stops was further filtered to be within 0.5 mile of a segment of a highway with ADDTT > 5,000 vehicles/day. A stratified random sample of 25 intercept locations will be taken from this universe. Pre-notification letters will be sent to the truck stops to ensure cooperation of the establishment for the survey. Replacement sites will be drawn from the same stratum for hard refusals. Table B2 quantifies the number of truck stops according to state (or a group of states) and the FAF AADTT 2007 traffic. Table cells are also classified into sampling strata, and designated with capital letters. For instance, sampling stratum I consists of three entries in the 5,000-10,000 traffic column (California; Mountains; Pacific NW) and one entry in the 10,000-15,000 traffic column (California). Similarly, sampling stratum A consists of one entry in the 10,000-15,000 column (Southwest) and two in the 15,000+ column (California and Southwest). One truck stop will be sampled from most strata; two truck stops will be sampled from strata A, B, C, and Q. At 20 locations, interviews with truck drivers will be conducted on one day, and at the remaining 5 locations, selected randomly from the highest traffic sites in strata A–G, the interviews will be conducted on two consecutive days.

Because EOBR-using trucks are only estimated to be 14% (per the 2011 Road Check conducted by the Commercial Vehicle Safety Alliance), truck drivers will be screened for the use of EOBRs. Interviews will be attempted with all EOBR users, while EOBR non-users will be sampled at a lower rate at each site. Usage of EOBRs will be screened by handing drivers a card listing EOBRs as well as other technologies sometimes found in trucks and asking them to indicate which are in their truck, helping to ensure that drivers do not understand the focus on

³ We would like to thank William (Karl) Sieber (CDC/NIOSH) for sharing the list of truck stops used in National Survey of U.S. Long-haul Truck Driver Injury and Health. This list was based on Brice TA: *The Trucker's Friend and National Truck Stop Directory 2008*. Clearwater, Florida: TR publications. Abt SRBI geocoded the addresses and (partially) matched the truck stops with the FAF traffic estimates (FAF³ Freight Traffic Analysis, Oak Ridge National Laboratory, 2011, http://faf.ornl.gov/fafweb/Data/Freight_Traffic_Analysis/index.htm).

EOBR during the screening process. Target sample sizes on non-users will be established for various parts of the day in order to ensure that data is collected from both users and non-users throughout the day and are not limited to a specific day-part. The target number of completed interviews per site is 10 EOBR non-users, and up to 8 EOBR users per day, provided a sufficient number of EOBR users are screened. Locations with higher traffic will be sampled at higher rates.

As Table B2b shows, the probabilities of selection of a vehicle for most stops vary in the range of 17:800,000 to 17:400,000, where 17 is the target number of interviews per site per day, producing a sample of drivers that is not too heavily imbalanced. This will ensure a sufficient number of EOBR interviews per site, and serve as a protection against an overly optimistic preliminary estimate of EOBR incidence. Stratification is aimed at the practical issue of achieving appropriate geographic coverage. Since the sampling designs with one PSU per stratum do not allow unbiased variance estimation, strata with similar geographies will be merged to produce pseudo-strata, with truck stops nested as PSUs, and drivers nested in stops as SSUs. The strata for variance estimation will be merged as follows: D+E, F+L, G+N, H+I, J+R, K+S, M+U, O+P+T.

Table B2a. Frame information for the truck driver intercept survey.

Frame information	FAF ³ AADTT 2007 traffic			
	5,000– 10,000	10,000– 15,000	15,000+	Total
Total # of stops				6,168
Of these, within 20 miles of MSA population 500,000+				2,900
Matched to address or interstate exit	834	379	252	1,465
<i>California</i>	46 (I)	14 (I)	35 (A*)	95
<i>Great Plains (MN, IA, MO, KS, NE, OK)</i>	101 (R)	24 (J)	13 (J)	138
<i>I-95 NE corridor (CT, DE, MA, MD, NY, NJ, RI, VA)</i>	90 (S)	25 (K)	30 (D)	145
<i>Memphis hub (TN, AK)</i>	34 (T)	45 (L)	22 (F)	101
<i>Mountains (CO, ID, NV, ND, SD, UT, WY)</i>	24 (I)	9 (H)	3 (H)	36
<i>Other Northeast (ME, NH, VT)</i>	9 (S)			9
<i>Pacific NW (OR, WA)</i>	6 (I)	9 (H)	4 (H)	19
<i>South (LA, MS, AL)</i>	54 (T)	19 (O)	5 (C*)	78
<i>South Atlantic (NC, SC, GA, FL)</i>	154 (U)	75 (M)	38 (B*)	267
<i>Southwest (NM, AZ)</i>	25 (T)	4 (AA)	7 (A*)	36
<i>Steel corridor (PA, OH, MI, WV)</i>	148 (Q*)	54 (K)	24 (E)	226
<i>Texas</i>	75 (P)	43 (O)	39 (C*)	157
<i>Upper Midwest (IN, IL, WI, KY)</i>	68 (Q*)	58 (N)	32 (G)	158
Probabilities of selection	1:90–1:150	1:25–1:80	1:18–1:32	

* two truck stops are to be sampled from these strata.

Table B2b. Frame information for the truck driver intercept survey.

Stratum	Geography	Traffic volume	Stops on the frame	Stops sampled	Probability of selection of a vehicle
A	California Southwest (NM, AZ)	15,000+ 10,000+	46	2	< 17:315,000
B	South Atlantic (NC, SC, GA, FL)	15,000+	38	2	< 17:285,000
C	South (LA, MS, AL), Texas	15,000+	44	2	< 17:330,000
D	I-95 NE corridor (CT, DE, MA, MD, NY, NJ, RI, VA)	15,000+	30	1	< 17:450,000
E	Steel corridor (PA, OH, MI, WV)	15,000+	24	1	<17:360,000
F	Memphis hub (TN, AK)	15,000+	22	1	<17:330,000
G	Upper Midwest (IN, IL, WI, KY)	15,000+	32	1	<17:480,000
H	Mountains and Pacific NW (CO, ID, NV, ND, SD, UT, WY, OR, WA)	10,000+	26	1	<17:300,000
I	California Mountains and Pacific NW (CO, ID, NV, ND, SD, UT, WY, OR, WA)	5,000–15,000 5,000–10,000	72	1	17:790,000–17:430,000
J	Great Plains (MN, IA, MO, KS, NE, OK)	10,000+	37	1	<17:435,000
K	I-95 NE corridor (CT, DE, MA, MD, NY, NJ, RI, VA), Steel corridor (PA, OH, MI, WV)	10,000–15,000	79	1	17:1,185,000–17:790,000
L	Memphis hub (TN, AK)	10,000–15,000	45	1	17:675,000–17:450,000
M	South Atlantic (NC, SC, GA, FL)	10,000–15,000	75	1	17:1,125,000–17:750,000
N	Upper Midwest (IN, IL, WI, KY)	10,000–15,000	58	1	17:870,000–17:580,000
O	South (LA, MS, AL), Texas	10,000–15,000	62	1	17:930,000–17:620,000
P	Texas	5,000–10,000	75	1	17:750,000–17:375,000
Q	Steel corridor (PA, OH, MI, WV); Upper Midwest (IN, IL, WI, KY)	5,000–10,000	216	2	17:1,080,000–17:504,000
R	Great Plains (MN, IA, MO, KS, NE, OK)	5,000–10,000	101	1	17:1,010,000–17:505,000
S	I-95 NE corridor (CT, DE, MA, MD, NY, NJ, RI, VA); Other Northeast (ME, NH, VT)	5,000–10,000	99	1	17:990,000–17:495,000
T	Memphis hub (TN, AK), South (LA, MS, AL), Southwest (NM, AZ)	5,000–10,000	92	1	17:940,000–17:480,000
U	South Atlantic (NC, SC, GA, FL)	5,000–10,000	154	1	17:1,540,000–17:770,000

Stratum	Geography	Traffic volume	Stops on the frame	Stops sampled	Probability of selection of a vehicle
	Total		6,168		
	Within 20 miles of MSA population 500,000+		2,900		
	Within 20 miles of MSA population 500,000+ and 0.5 miles from a high ADDTT highway segment	5,000–10,000 10,000–15,000 15,000+ Total	834 379 252 1,465	25	17:1,540,000– 17:330,000

Note: the ratio 17:500,000 indicates that 17 trucks will be sampled at a given location, and the estimated traffic through the sites in the stratum is 500,000.

A recently conducted NIOSH/CDC study “National Survey of Long-Haul Truck Driver Injury and Health” (Sieber 2012)⁴ reported an achieved response rate of 45% by using a similar sample design including truck stop intercepts. McCartt et. al. (2000) reported a “participation rate” of 74.9% via the intercept surveys conducted at public full-service and limited-service rest areas, private full-service truck stops, and at routine truck safety inspections. For planning purposes, FMCSA thus expects the response rate of 50% for the driver intercept survey. The sample size will be limited by the interviewing hours rather than the response rate.

2. DESCRIBE PROCEDURES FOR COLLECTING INFORMATION INCLUDING STATISTICAL METHODOLOGY FOR STRATIFICATION AND SAMPLE SELECTION, ESTIMATION PROCEDURES, DEGREE OF ACCURACY NEEDED, AND LESS THAN ANNUAL PERIODIC DATA CYCLES.

Both the carrier and the truck driver surveys are planned as one-shot surveys. The data collection period for the carrier survey will be 2 months (initial mailing, a reminder postcard two weeks later, and a second follow-up letter 4 weeks after the initial mailing). The data collection period for the driver survey will be 1 week, and depend on the logistic of the interviewing teams at the 25 selected sites. No periodic data collection is needed nor envisioned for this study.

2a. The carrier survey

The MCMIS Census File will be used as the sampling frame for the carrier survey. The sampling universe will be stratified by the type of operation (interstate, Hazardous Materials interstate, intrastate, type of cargo/passenger operation, entity type) and the fleet size (See, Table B1). The selected sample motor carriers will be representative of the population of the motor carriers with 50 + vehicles (power units). FMCSA expects that the smaller carriers will have a small incidence of EOBR users, and FMCSA will save resources by concentrating the data collection effort on the larger carriers.

The unequal probability of selection due to differential sampling rate across strata would lead to minor losses of efficiency in the carrier-level estimates through the application of differential weights. Assuming a uniform non-response rate across strata, the expected coefficient of variation in weights becomes 0.34, and it leads us to assess the design effect of 1.12 ($DEFF = 1 + CV^2$). For a variety of response rate scenarios, Table B3 shows the effective sample sizes, margins of error, and power to detect differences.

⁴ Sieber, William, private communication (email and document from July 20, 2012).

Table B3. Margin of error and power for different response rates in the carrier mail survey.

(1) Response rate	(2) # of completes = 4000 * (1)	(3) Effective sample size = (2) / DEFF	(4) 95% margin of error, 50% baseline incidence = $\frac{Z_{0.975}}{\sqrt{0.5 \cdot 0.5 / (3)}}$	(5) 95% margin of error, 10% baseline incidence = $Z_{0.975} \sqrt{0.1 \cdot 0.9 / (3)}$	(6) Difference from 10% detectable with 80% power	(6) Difference from 50% detectable with 80% power
5%	200	179	7.33%	4.40%	6.8%	10.4%
10%	400	358	5.18%	3.11%	4.7%	7.4%
20%	800	716	3.66%	2.20%	3.3%	5.2%
30%	1200	1074	2.99%	1.79%	2.7%	4.3%

Driver-level estimates, if required, will be computed from the carrier-level data. They may have lower DEFFs due to larger number of drivers being employed by larger carriers that are sampled with higher probability of selection.

The baseline sampling weights will be computed as inverse probabilities of selection within strata. The sampling weights will be adjusted for the non-response by computing the ratio of the frame count to achieved sample size within strata.

2b. The truck driver survey

The known universe of the intercept points consists of 6,168 truck stops listed in Trucker’s Friend. Of the locations in the frame, 1,465 satisfy the criteria of being 20 miles from a metropolitan statistical area (MSA) with population 500,000 or more, and within 0.5 mile from a highway with annual average daily truck traffic (AADTT) of 5,000 or more. As specified in the survey instrument, the eligible drivers will be those who are required to keep a record of their work hours (i.e. driving hours, rest or break-times, etc.) to comply with the federal hours of service (HOS) regulations. A team of two interviewers will be working at each site (20 intercept locations for one day, and 5 intercept locations with the greatest anticipated traffic among the sampled locations, for two days) and they will be working for a total of 60 data collection person-days. Based on the target completion time of 20 minutes per interview, 5 minutes for the screener and the interview completion rate as observed in the NIOSH study, one field day will yield 10 interviews with non-EOBR users and between 6 and 8 interviews with EOBR users. FMCSA will use a conservative sample size for each of the 30 intercept sites which will lead to selecting and interviewing 17 drivers of motor carriers at each site for a total of 510 driver interviews from all 25 intercept sites. The effective sampling rate will be determined from the intercept site traffic data.

The sample design proposed in Section 1b has one PSU per stratum for most strata. Since such a design makes unbiased variance estimation impossible, stratification will be ignored at the analysis stage. Clustering and varying probabilities of selection will be used in analysis.

The proposed design will have unequal probabilities of selection of PSUs leading to the DEFF due to the (first stage selection) variability of weights estimated at 1.45. Since the second stage sampling rate of EOBR users will be close to 100%, the DEFF for this subgroup will be in the range from 1.60 to 1.80. Additional differences in sampling rates for non-EOBR users will imply a smaller design effect for that subpopulation in the range from 1.25 to 1.35, as the first stage sampling is performed with probability increasing in traffic; the second stage selection probabilities, on the other hand, are lower in strata with greater traffic, so the total probabilities of selection will be closer to being equal. The overall design effect due to unequal probability weighting is estimated to be in the range from 1.80 to 2.10. This DEFF will be applicable to the sample means, proportions, and one-sample tests.

The five locations in which the interviews will be repeated the next day will be either the locations with the greatest number of parking spots, or the largest volume of traffic. Either of these site characteristics can be viewed as proxies for the foot traffic at the truck stop. Selection probabilities for these stops will be refined via simulation of the sampling process from the frame.

Table B4. Design effects, effective sample size, margin of error and power for the in-person intercept surveys of truck drivers.

(1) ICC	(2) DEFF for EOBR users	(3) Effective sample size for EOBR users	(4) MOE at 95% level for EOBR users	(5) DEFF for EOBR non-users	(6) Effective sample size for EOBR non-users	(7) MOE at 95% level for EOBR non-users	(8) Difference between EOBR users and non- users detected with 80% power
Optimistic scenario: sufficiently high incidence and response rates 6/7/8 EOBR completes/day at sites with AADTT 5,000–10,000–15,000 and above Total nominal sample size of EOBR users: n=217							
0.01	1.69	128.2	8.7%	1.28	233.8	6.4%	8.28%
0.02	1.80	120.3	8.9%	1.39	216.0	6.7%	8.62%
0.05	2.14	101.6	9.7%	1.70	175.7	7.4%	9.57%
Intermediate scenario: low incidence, high response rate 4/6/8 EOBR completes/day at sites with AADTT 5,000–10,000–15,000 and above Total nominal sample size of EOBR users: n=194							
0.01	1.74	111.6	9.3%	1.28	233.8	6.4%	8.77%
0.02	1.84	105.6	9.5%	1.39	216.0	6.7%	9.05%
0.05	2.13	91.0	10.3%	1.70	175.7	7.4%	9.97%
Pessimistic scenario: low incidence, low response rate 4/5/6 EOBR completes/day at sites with AADTT 5,000–10,000–15,000 and above Total nominal sample size of EOBR users: n=157							
0.01	1.68	93.4	10.1%	1.28	233.8	6.4%	9.36%
0.02	1.76	89.1	10.4%	1.39	216.0	6.7%	9.67%
0.05	2.00	78.4	11.1%	1.70	175.7	7.4%	10.56%

Note: the baseline incidence rates in (4), (7) and (9) are assumed to be 50%. All scenarios assume 10 EOBR non-user interviews per site per day.

Bellman et. al. (2005) study⁵ found the intra-class correlations (ICC) due to intercept point clustering of variables such as miles driven, ever being in an accident, being an owner-operated vehicle, being black, and being Hispanic, to be on the order of 0–0.4%. However, if the driver or carrier characteristics exhibit strong regional or local patterns, the percent value of ICC may reach to double digits after the decimal point, drastically reducing the effective sample size and increasing the margin of error. Using the expression for the design effect of a cluster sample (Kish 1970): $DEFF = 1 + ICC (m-1)$ where m is the sample cluster size (i.e., $m=15-18$ drivers per site), the design effect, effective sample size, and margin of error by intra-class correlation

⁵ ¹Belman D, K Monaco, TJ Brooks. 2005. *Sailors of the Concrete Sea*. East Lansing, Michigan: Michigan State University Press.

(ICC) are shown in Table B4 for several scenarios of the intra-class correlations and the response and incidence rate scenarios. With the corrections for ICC and clustering, the overall DEFF will range from a low value of 2.05 (low ICC and low variability of selection probabilities) to a high value of 3.25 (high ICC and high variability of selection probabilities). For most scenarios considered, the survey will provide sufficient accuracy to detect 10% differences of incidence between EOBR user and non-user groups with a power of 80% or higher.

The baseline sampling weights will be computed as inverse probabilities of selection of the intercept locations times the inverse probability of selection within the location (estimated traffic per site/# of interviews, separately for EOBR users and non-users). Non-response adjustments will be made as the ratio of the number of drivers who were approached at each intercept location to the number of drivers for which the questionnaires were completed in the same location.

Note: the sample size for one-sample tests (carrier survey) is computed using the formula⁶

$$n = \left[\frac{z_{1-\alpha/2} \{p_0(1-p_0)\}^{1/2} + z_{1-\beta} \{p_1(1-p_1)\}^{1/2}}{p_1 - p_0} \right]^2$$

where $\alpha=5\%$, $\beta=80\%$, $p_0 = 10\%$ or 50% , and p_0 and p_1 is the incidence under, respectively, the null hypothesis and the alternative hypothesis. The sample size for two-sample tests (truck driver survey) is computed using the formula⁷

$$n_1 = \frac{n'}{4} \left(1 + \left[1 + \frac{2(r+1)}{n' r |p_1 - p_2|} \right]^{\frac{1}{2}} \right)^2,$$

$$n' = \frac{\left[z_{1-\alpha/2} \left((r+1) \bar{p} (1-\bar{p}) \right)^{\frac{1}{2}} + z_{1-\beta} \left(r p_1 (1-p_1) + p_2 (1-p_2) \right)^{\frac{1}{2}} \right]^2}{4 r (p_1 - p_2)^2}, r = \frac{n_2}{n_1}, \bar{p} = \frac{p_1 + r p_2}{r+1}$$

Stata statistical package (command sampsi) was used to compute the sample size requirement for a given alternative hypothesis value. The incidence under the alternative hypothesis that matched the effective sample size was reported in the last two columns of Table B3 and in the last column of Table B4.

Prior to administering the questionnaire, drivers will be briefed about the purpose of the study and an informed consent form will be obtained from those drivers who decide to participate in the study. Drivers will be asked to sign the consent form and fill in the screener card. Drivers who decline to participate will not be asked to sign the consent form and will not be contacted in the future. Drivers who are willing to complete the questionnaire on site will be paired up with an interviewer to conduct the study by using the full survey instrument. As no contact information is requested from drivers of motor carriers, no follow-up contact will be possible. While conducting the field enumeration of intercept data collection for this research study, we

⁶ Pagano, M., and K. Gauvreau. (2000). *Principles of Biostatistics*. 2nd ed. Belmont, CA: Duxbury.

⁷ Fleiss, J. L., B. Levin, and M. C. Paik. (2003). *Statistical Methods for Rates and Proportions*. 3rd ed. New York: Wiley.

will give instructions to interviewers that once one driver's interview is over he/she needs to move on to the next sampled driver as quickly as possible, with minimal losses to the sample sizes.

3. DESCRIBE METHODS TO MAXIMIZE RESPONSE RATE AND TO DEAL WITH THE ISSUES OF NON-RESPONSE.

3a. The carrier survey:

The response rate to the mail recruit of carriers is expected to be 10%. The pilot study will be used to better inform our expectations of what response rate for the main mailing and survey will be. A number of factors may increase response rates. They include prominent use of an FMCSA logo and language regarding the importance of the project in the recruitment letter; a follow-up reminder postcard one week later; and a second letter two weeks after the first; using a web methodology so that respondents may complete the survey at a convenient time; and keeping the time to complete the online survey to a minimum. Also, federal surveys tend to generate higher response rates than academic or market research surveys. The web survey will prominently display the FMCSA logo to maximize response rates.

A non-response follow-up survey will be conducted on the telephone with 100 carriers who did not participate in the web survey. A shortened instrument will be used with 17 out of the original 29 questions. The participation rate on this non-response survey is not expected to exceed 20%, given that managers are under daytime pressures, the lack of an incentive, and the sensitivity of the topic. Given the design effect due to unequal probabilities of selection of 1.12, the respondent sample size of 420 (= sample size of 4,200 times the response rate of 10%), and the non-response follow-up sample size of 100, differences between respondents and non-respondents detectable with 80% power are 17.0% at the base incidence of 50%, 15.0% at the base incidence of 20%, and 12.2% at the base incidence of 10%, using a two-sided comparison of proportions with these sample sizes (Fleiss, Levin, and Paik.2003 as cited above).

3b. The truck driver survey:

Pre-notification letters will be sent to the sampled truck stops to establish rapport and ensure productive work environment for the interviewer team. Non-respondents will be followed up on the phone. Replacement sites will be drawn from the same stratum in case of hard refusals, thus maintaining the geographic coverage of the survey.

The topic of the survey is of great salience to the survey participants, so the agency expects them to be interested in providing their responses. Given that the drivers are responding to actual conditions in their work environments, they have a greater incentive to participate and respond to the survey questionnaire.

To increase the response rate, participants will be offered \$10 as compensation for their time. We expect 510 drivers to participate.

In addition, the following measures would be put in place to maximize the response rate:

- The time to complete the survey will be kept at the maximum of 20 minutes and the questionnaire items would be worded so that each question is clear and unambiguous.
- The federal sponsor logo and materials will be prominently displayed.

Non-responding drivers will have the option of answering a series of non-response questions at the moment, or, be given a self-addressed fold-in card with an abbreviated questionnaire. The questions will allow establishing the basic characteristics of non-respondents, and comparing them to respondents. The response rate for this non-response follow-up study is expected to be 20%. As the response rate for the main survey is expected to be 50%, the number of non-participating drivers will be the same as the number of respondents, and equal to 510; 20% of that yields a total of 102 drivers completing the NRFU. Moreover, since the selection probabilities of non-respondents are the same as those of respondents, the sample of non-respondents will share the same design effects due to stratification, unequal probabilities of selection, and clustering. Considering only the worst case scenario from Table B4, the main study effective sample size is $n_{eff} = 254$, and thus the sample size of non-respondents is $n_{eff,NR} = 51$. A two-sided comparison of proportions with these sample sizes (Fleiss, Levin, and Paik.2003 as cited above) provides a detectable difference of 22.1% at the base incidence of 50%; 20.1% at the base incidence of 20%; and 16.7% at the base incidence of 10% using the expressions given in Section 2b of Part B. These detectable differences improve to 18.6%, 16.5%, and 13.5%, respectively, for the most optimistic scenario with the lowest design effects.

4. DESCRIBE TESTS OF PROCEDURES OR METHODS TO BE UNDERTAKEN.

An initial round of qualitative in-depth interviews will be conducted with seven drivers and two carriers. The drivers will be recruited by the research team and will sign an informed consent form. Participant feedback from the in-depth interviews will be used to guide the final wording of the questionnaires. Time to complete the survey will be observed, and additional questionnaire design decisions will be undertaken if the average burden per completed questionnaire/interview exceeds 30 minutes.

The mail-to-web survey of carriers will be conducted in several mailings. First, the pilot study versions of the questionnaire will be mailed to 200 carriers. Mail recruitment will consist of a letter, with FMCSA logo; a reminder postcard; and a follow-up letter. This method has been found to be appropriate in maximizing the response rate,⁸ and will anchor expectations for the response rate in the full survey with carriers.

⁸ Dillman, Don. (2000). *Mail and Internet Surveys: The Tailored Design Method*. 2nd ed. John Wiley & Sons, NY.

5. PROVIDE NAME AND TELEPHONE NUMBER OF INDIVIDUALS WHO WERE CONSULTED ON STATISTICAL ASPECTS OF THE INFORMATION COLLECTION AND WHO WILL ACTUALLY COLLECT AND/OR ANALYZE THE INFORMATION.

Gene Bergoffen, Prime Contractor, MaineWay Services (207) 935-7948

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