

Appendix F-1

Canada results from Human Factors Questionnaire

SUMMARY OF RESULTS FROM CANADIAN DRIVERS

HUMAN FACTORS STRUCTURED INTERVIEW QUESTIONNAIRE

*Administered after first 2 weeks following the FMT No-FEEDBACK CONDITION
and after 4 weeks following the FMT FEEDBACK CONDITION*

SECTION A: ALERTNESS & FATIGUE MANAGEMENT TRAINING COURSE:

Instructions to drivers for Questions 1 through 7: Using the *five point scales* below, please circle the numbers to rate the “Mastering Alertness and Managing Driver Fatigue” training course you received from Dr. Krueger before participating in the testing.

Rating scale from 1 to 5 (used for questions 1-6)

1	2	3	4	5
Disappointing/ Confusing	Of low value/ Not helpful	Neutral/Take it or leave it	Good/ Helpful	Very helpful/ Applicable

Q. 1. Material/content in the course.

Mean rating following the **No Feedback Condition** = **4.38** (n = 26)

Mean rating following the **Feedback Condition** = **4.23** (n = 26)

Q. 2. Knowledge gained from course.

Mean rating following the **No Feedback Condition** = **4.31** (n = 26)

Mean rating following the **Feedback Condition** = **4.23** (n = 26)

Q. 3. Applicability of course to my lifestyle.

Mean rating following the **No Feedback Condition** = **3.88** (n = 26)

Mean rating following the **Feedback Condition** = **3.81** (n = 26)

Q. 4. The lessons learned will help me in my job.

Mean rating following the **No Feedback Condition** = **4.46** (n = 26)

Mean rating following the **Feedback Condition** = **4.15** (n = 26)

Q. 5. I used some of the lessons learned during these past 2 weeks.

No Feedback Condition: Yes = 24 No = 2 no answer = 0

Feedback Condition: Yes = 23 No = 2 no answer = 1

Q. 6. *The lessons learned will be put into practice by me in the future.*

No Feedback Condition: Yes = 25 No = 1 no answer = 0
Feedback Condition: Yes = 25 No = 1 no answer = 0

Q. 7. Please write your general comments about the ALERTNESS & FATIGUE MANAGEMENT TRAINING course. The material. It's usefulness to you. Things you might want changed or improved, etc.

Comments summarized from 15 Drivers

Driver: Material was adequate, we should have had a day or 2 prior to the course to read all material, etc.

Driver: As my driving run is a set start time the lessons would be hard to use at present. It would be far more useful on open dispatch.

Driver: It will help me to know what to watch for on the job; knowing where my weakness lies. I believe it will be of good use for me in the future of my work and social life.

Driver: Well directed to aim of study and reason for testing with findings from study to be applied to any future driving regs. and possible installation of certain equipment in vehicles. This fatigue material should be transferred into a driver education program.

Driver: It was very well explained

Driver: Much improved my awareness of fatigue and gave me feedback as to when I was more tired than what I was admitting to myself.

Driver: Fatigue material brought everything back to the surface, made sense. He is from a driving family, father, uncles, etc. He discussed these FMT items with his Dad, especially the HPCS, which he likes a lot. He says there are some bad drivers out there who don't stop when they should. He says he knows pretty well when he's fatigued and when to shut truck down for a rest.

Driver: I will get more sleep.

Driver: I found the course quite interesting. I discovered that I already instituted many of the fatigue management criteria in my daily driving. I just didn't know what I was doing or why. I now have a better understanding of fatigue and its general effects.

Driver: (after first 2 weeks) So far it has been useful focusing this driver's attention to the amount of fatigue we experience. Not taken for granted as much any more.

Driver: (after 4 weeks) The course was very good. It shed light on often forgotten subjects. Drivers just assume that being tired a lot, not sleeping well, or irregularly, is normal. It is refreshing to see study and research being done on this most important subject. – Sleep levels (stages 1-5) were particularly interesting.

Driver: Very useful. I learned some new things and others I'd forgotten about. I thought it was very good. It helped remind me of things I had taken in the past.

Driver: I have had previous courses on it.

Driver: I did enjoy doing it. It left me wanting another 2 weeks to fine tune the systems. It would be great to take the course again because I have a lot of Q.s.

Driver: Most rules and hints I have used on daily basis. As I have had previous exposure to program.

SECTION B: SLEEPWATCH WRIST MONITOR

Questions 8 through 18, instructions to drivers: Please rate the **SleepWatch Wrist Monitor**, a personal sleep management tool meant to help you enhance your alertness for driving. Base your ratings on everything you did or experienced using the equipment during the several weeks you participated in our project.

Q. 8. Approximately what percentage of the time (24/7) during these past 2 weeks, while you participated in the study, did you wear the SleepWatch?

Summary of results: All but 2 drivers indicated they wore the SleepWatch between 90 and 100% of the time the entire 4+ weeks we asked them to wear it 24/7. The debrief interviews recorded occasional lapses in compliance, as did the actual data themselves.

Q. 9 If you did not wear the SleepWatch continuously, (i.e. almost 100% of the time) what were some of the circumstances surrounding when you did not wear the SleepWatch?

Summary results: There were a variety of reasons given as to when and why drivers might have had the SleepWatch off their wrists from time to time. A representative sample of their explanations follows:

Driver: Wore it all times. I wore the sleep watch 100%. I had it off when I took my bath that's all. (Other drivers also indicated they removed it when showering, or bathing, swimming; doing yard work.)

Driver: I don't wear a wristwatch; I dislike them. This driver said several times he found he had taken it off for hours during sleep and he had to look for the SleepWatch in bed after awakening.

Driver: Once in the first week to do dishes – Once in third week left it on dining room table all night.

Driver: It was off my wrist for 4 days for the long week, and while I was working on the farm.

Driver: I forgot the sleep watch first night Feedback. It was off my wrist – he showed it to his wife and set it down and forgot it.

Driver: I had been informed of wrong date for completion of study, so I took it off several days early.

Driver: I would take off when socializing, because it made my wrist smell badly.

Q. 10. Was it bothersome to have the SleepWatch Monitor continuously on your wrist?

Summary of results: A total of 16 drivers (62%) during No Feedback condition and 15 (58%) drivers in Feedback condition wrote “no” in answer to this question. Examples of responses from the other 10 drivers (38%) who answered “yes” follow (more than 1 comment came from multiple drivers):

Driver: Yes. It’s too big. I do not like to wear a watch, so I found it bothersome.

Driver: Yes. It’s too big and bulky. The wristband is too long

Driver: Yes. It was very uncomfortable since I do not wear a watch. Also the small metal tag on back cut my wrist.

Driver: Yes. I never wear any jewelry and therefore I found it unusual to be wearing the watch.

Driver: Yes. Because I don’t wear a watch

Driver: Yes. I don’t wear a watch to bed

Driver: Yes. I don’t wear a watch normally but I got used it as time went on.

Driver: I’m not used to wearing a watch, it left nasty rash on my wrist.

Driver: Yes. Skin irritation; it also was too bulky. Another said the metal was causing an irritation; and it was also too big.

Driver: Yes. Skin rash developed – the watchband smelled – just generally it was uncomfortable, but I am not a watch wearer.

Driver: Yes. It’s not possible to wash properly. I got a small rash from rubbing, but it went away eventually. I wore it in the shower, got soap around the band. Then got a rash. I had to use an antiseptic cream and that cleared up the rash.

Driver: Just when it is hot outside. The wristband is sticky.

Driver: When it was humid, I really didn't want to wear the watch.

Driver: No. I am normally not a watch wearer – so I was surprised that it didn't bother me. It felt funny to wear it in the shower.

Driver: Yes. It would be nice if it was slimmer so it didn't interfere with work gloves.

Driver: Yes. A little too big on me. Keeps getting caught on things.

Driver: Yes. The little plastic sticker on the back of the watch was very annoying.

Driver: Only problem with watch was either too loose or too tight. Woman's wrist structure needs to be accommodated.

Driver: Yes. Yes. Yes. It smells, gave me a rash and bruised, its bulky.

Driver: The watch should have a "date display" and should be able to monitor pulse rate, and have a 24-hour clock.

Rating scale from 1 to 5 (used to answer question 11)

1	2	3	4	5
Strong dislike/ Needs much improvement	Not satisfactory/ It needs some improvement	Neutral opinion about it	It's helpful/ It was okay	Very helpful/ I liked it

Q. 11. The SleepWatch numerical rating mirrored the way I felt
Mean rating following the **Feedback Condition** = **3.50** (n = 26)

Q. 12. SleepWatch provides useful information for managing a person's sleep schedule

Summary of results: A total of 14 drivers (54%) during the Feedback condition wrote "no" in answer to this question, the remaining 12 (46%) wrote "yes".

Q. 13. Did you like the SleepWatch scale of alertness (e.g. 1 to 99)?

Summary of results: A total of 19 drivers (73%) during the Feedback condition wrote "yes" in answer to this question, the remaining 7 (27%) wrote "no".

Q. 14. Can you suggest a better way to display the SleepWatch information?

Comments summarized from 8 Drivers

Driver: No, the way it displayed is correct.

Driver: On the wrist is good. Just need to streamline it.

Driver: Make “P”: info appear on face at all times.

He said he rarely depressed the button to get the “P” value; rather, he frequently consulted only the “hash” marks as an indicator of his level of alertness, or accumulated sleep, etc.

Driver: Present the per-day sleep time basis, as well as present the per week information.

Driver: Not at this time. I find it was okay. Another wrote: I believe the display is fine.

Driver: No, I think the display is fine; it just didn’t seem to reflect how I felt.

Driver: Went to bed @ P=75, was that good or bad? It’s very hard to interpret the P numbers.

Driver: Perhaps pinned to the shirt, jacket or design it as a hearing device.

Q. 15. SleepWatch information provided was helpful supporting my sleep planning/managing alertness during the past 2 weeks

Mean rating following the **Feedback Condition condition = 3.27** (n = 22)

Q. 16. I would like a SleepWatch for myself?

Summary of results: A total of 15 drivers (58%) wrote “no” in answer to this question while 10 drivers (42%) responded “yes”. One driver left this question blank. Selected comments follow.

Driver: Yes. It seemed to match my alertness

Driver: No.. It must be of some help; but we know when we are tired.

Driver: No. I found it hard to read. It says I’m tired when I’m not; and not tired when I was.

Driver: No. I don’t like watches and I sleep when I feel the need. I could not fall asleep on command.

Driver: No. It’s of no use to me. I did not depend on the SleepWatch. I know when I am tired. If you give this to women truck drivers you need to make it look like attractive jewelry.

Driver: No. It needs more testing. I’m not sure if it is good or not.

Driver: Yes. It helps to know when I am pushing it.

Driver: No. It read a P of 79 or 80 and I couldn't relate it to myself when I'm "half-tired." Then this driver questioned what half-tired means? When am I really fatigued, at a P of 50 or 30?

He rated SleepWatch at a score of 4 out of 10 on a 1 to 10 scale, and he said, recall I have a bias against wrist watches.

Driver: No. Driver was interested at what my P rate was at different times of the day. The hash marks and the "P" value correlated the same at night 75-76; and in daytime at P= 86 or so. They were in pretty close agreement.

Driver: No. One weekend, I was up over 24 hrs but the SleepWatch never went under P=75. It's a nice guideline.

Driver: Yes. When asked to rate FMT devices on scale of 1 to 10 this Driver rated SleepWatch a score of 8 to 9 and said he would want it. She "enjoyed the watch"; she said she simply consulted the hash marks and rarely pushed the P button.

Driver: Yes. It's good. It tells me that I am really tired even though I don't think I am sleepy.

Driver: Yes. I would also like one for my fiancé. He seems to keep driving even when he is too tired.

Driver: No. At this time, I am very over-tired – last proper sleep ended 17 hrs ago – but the P still reads 75%.

Driver: Yes. It would be very useful to plan sleep and to check up on yourself.

Driver: No. When I would wake up, the watch would say 89; 2 hours later: 98. When I went to sleep P was at 85. That's confusing to me.

Q. 17. I would recommend SleepWatch to fellow drivers.

Summary of results: A total of 13 (50%) drivers responded "yes" to this question, and 13 (50%) responded "no". Selected comments follow.

Driver: No. SleepWatch gave P scores which were too high. I got 89s when I was in fact sleepy. The SleepWatch needs a pushbutton Light & Date. I needed to turn on the light in my sleeper berth to read the SleepWatch in the middle of night to see the time.

Driver: No. A Light and the Date are needed on SleepWatch. In the middle of night, asleep, I wake up, and I can't see sleep watch, so I must then turn on the dome light to see the time.

Driver: SleepWatch – it's a pretty cool device and I liked it. But when humidity is high the wristband chaffed my wrist.

Driver: Yes. He likes it. Wants a pulse monitor to know if driver is to sleep. -can't put it in water; -convinced mom she was too tired to do dishes; -she liked it as she looked at it and said yes I should get more sleep so my allergy medication would work better. -she looked at "P" & at hash marks; -she does a lot of swimming and took it off; -she got a low 50s score and lots of 100s.

Driver: No. He rated the SleepWatch = 7 on a scale of 1 to 10. He said you should not have to have a watch to tell you when to go to bed. Driver should monitor his own fatigue. He thinks the "dollar" drives driver fatigue; that is drivers drive too long to make more money.

Often his Sleepwatch did not reflect a realistic "P" value as for example, he said at noon yesterday he was really tired, even fatigued, the SleepWatch read P=89. He got off the road to take a nap. He said it read P=high 90's one night when he was bleary-eyed driving his wife home and could barely stay awake.

He complained the experimenters gave him too little information about the meaning of the SleepWatch "P" values. That is, what does P= 75, or 89, or 93 mean? He questioned the relationship of P values to his experience. For example, he would get up and it would read 89 or so and only after driving through several hours till mid-morning would the "P" climb to 95 or so. It seemed it should have read 95 first thing after awakening, not hours later.

Driver: No. He rated the SleepWatch 6 on scales. Out of all the fatigue gadgets, it was out of whack most days. One day it was at 100, but when he worked on the farm, he took SleepWatch off for 3 days and would work around and in equipment grease. On Sept 6th when he handed in his SleepWatch, it read 64% - but he insisted he had the afternoon the day before. 2 hrs 1030 – 1230 he slept. Then he slept 8am to 11am the day he was debriefed but he was still groggy. He said: I don't understand the readings – like the P=64 today

Driver: Blank, presumed "no". She rated the SleepWatch 5-6; and said it was too big, too bulky, and it irritated the wrist.

Driver: No. She rated the SleepWatch a 2 on a scale of 1 to 10. Said it was useless; not at all useful.

Q. 18. What suggestions do you have on how to improve the SleepWatch to make it more useful for truck drivers?

Driver: Make it thinner – give it a light for night use. Should be able to take it on and off when you want to without it getting it confused. I found that the watch would not read properly. On a Monday that I had to work I did not

get any sleep the night before and it said that I was not fatigued. Another problem that I had is that when I went to bed I would be wearing the watch and when I woke up it was gone from my wrist. I must have removed from my wrist while I was a sleep.

Driver: It's a gadget you like it or you do not. If it's to be a useful gadget it would have to be a "multi-function watch" that does several other useful things. We drivers don't need more gadgets; we even cut down on clothing so as not to produce more laundry – travel as light as we can.

Driver: I don't think something like that will work or people will not trust it enough.

Driver: It's a bit bulky. It could be wider but thinner.

Driver: Some days when he had sleep it didn't match his sleep pattern; RT was high (slow) on PVT, and he was tired, fatigued & sleepy, but the SleepWatch conflicted w/ the PVT RTs. This driver was over 50 yrs old; and we might Q. which WRAIR sleep model he had in his particular watch.

Driver: When he read the P=75, he also thought he needed a nap. He thought the SleepWatch could be useful. He rated it 8 to 9 on scale of 1 to 10. The watch is a little bit thick and it could be a little smaller. So he would want a sleep watch. He consulted the hash marks more than the "P" value, didn't even need to push the button to look for the P value.

Driver: he checked almost every day; like both the hash marks, & "P" on it. It's a little bit thick. He wore it all the time, never took it off –took a shower, he dunked it into his pond a few seconds while working in the yard; but it seemed okay on Sunday.

Driver: She wants a dated light on SleepWatch.

Driver: Show in the dark.

Driver: put a pulse monitor, date & alarm in it, like a Timex type of watch.

Driver: Perhaps it needs a re-calibration. I never saw it below 71%.

Driver: Make it thinner. With a P = high 70's, hash marks were sort of helpful reflecting amount of sleep.

Driver: Add a calculator to it.

SECTION C: SAFETRAC WINDOW MOUNTED CAMERA AND LANE TRACKING DISPLAY

Questions 19 through 32, instructions to drivers: Please rate the **SafeTRAC Window Mounted Camera and Lane Tracking Display.**

Answer Q.s on the SafeTRAC System based upon monitoring your driving within the lanes, etc.

Q. 19. The SafeTRAC camera position in the windshield distracted me?

Summary of results: A total of 23 drivers (88%) wrote “yes” in response to this question. Examples of responses from the remaining drivers (12%) who responded “no” follow:

Driver: No, only at the beginning.

Driver: No. I thought that it was in the right spot. It is small enough that it does not interfere with looking out the window.

Q. 20. The SafeTRAC system was easy to adjust

Summary of results: A total of 15 drivers (57%) responded “yes” to this question, 7 drivers responded “no”, and 4 drivers left this question blank or indicated that the question did not apply or they did not have to adjust the SafeTRAC system.

Experimenter’s notes: *Throughout the 4-week study, we asked the drivers not to make any adjustments to the SafeTRAC controls. The SafeTRAC system provides a user with a set of procedural and sequential steps which necessitate making sequential pushbutton steps on the volume control knob to set several preferential tolerance parameters of when it would “beep” to alert the driver that his/her truck tires had crossed a road lane line, and to set some limits on the volume of the beeps. Presumably an owner of the SafeTRAC system would become familiar with these control parameters and know how and when to make such preferential adjustments.*

However, for experimental control, to ensure all drivers were obtaining similar SafeTRAC feedback in this study, we asked the drivers not to make adjustments. And we did not give them the instruction sheets on how to set the SafeTRAC parameters, nor train them to do so. We set it up one way and expected the drivers to leave those settings alone. The thinking was that out there on the road we would have no way of determining what settings the driver was using and when; and also there would be no way to ensure the driver reset the controls for dynamically changing road conditions.

This experimental control provision proved to be somewhat problematic, because the drivers expressed numerous complaints about the SafeTRAC parameters being too sensitive. It “beeped” at them at them much more frequently than it should, especially when on narrow or 2 lane highways, where the painted road lane lines were closer together than they are on interstate highways. Unfortunately, from time to time, for some drivers this beeping also occurred during the “no feedback” condition, during a time when they drove it without benefit of the SafeTRAC lane position display because it was shrouded over, but they occasionally heard beeps.

In subsequent experimental work with the SafeTRAC the conditions of driver control over the beep, volume, and display parameters will have to be thought out much more carefully in experimental design and procedural set up.

During the study, there were several instances when both the drivers and the experimental assistants were not sure the SafeTRAC system was calibrated properly. This happened at least

twice when broken windshields had to be replaced and the maintenance personnel who reinstalled those windows had to re-mount the SafeTRAC camera, and recalibrate it themselves. At other times, the SafeTRAC mounting and calibration came into Q., while the driver and truck were out on the road. We had to await the driver returning to the home station for frequent check outs of the SafeTRAC system.

In this study the FMT systems were always “on” when the truck was Power up; so for example the FMT devices, like SafeTRAC had power on while a driver slept with the truck power turned on. Several drivers reported the SafeTRAC beeped at them when someone or something moved in front of the truck while the truck was actually stationary.

Comments summarized from 12 drivers:

Driver: Yes, if it is adjusted properly to begin with.

Driver: N/A. I never adjusted it.

Driver: No. The volume is too loud. Can’t seem to turn it down.

Driver: No, it wouldn’t stop beeping. SAFETRAC would calibrate and say “calibration failed” and would also beep and ask me if my window was clean. I had no way to adjust it properly.

Driver: Yes, but the plug in the back of SafeTRAC kept coming out when I closed/opened curtains at sleep time.

Driver: No. I didn’t have to adjust other than had to set drift alert.

Driver: No, maybe procedures for adjusting it should be covered in our training class; we where not taught how to adjust the SafeTRAC.

Driver: The noise I found was annoying.

Driver: Beeper going off when it should not.

Driver: The SafeTRAC could use a little wider field. It was sounding when I was more than 1 foot from the lane markers.

Driver: The SafeTRAC should not be so sensitive while road lanes are changing in width, i.e. in construction zones.

Driver: It is too sensitive and annoying

21. Use and location of SafeTRAC controls were good?

Summary of results: A total of 17 drivers (65%) responded “yes” to this question, the remaining 9 drivers (35%) answered “no”. Selected representative comments from 13 drivers follow.

Comments summarized from 13 Drivers:

Driver: Yes. We can see the screen right away.

Driver: Yes. Easy to use and also to read.

Driver: No. Location was not good – although it was temporary.

Driver: Yes, but it needs to be set to right. On the truck's left side it would go off (beep) with space between my tires and the lane.

Driver: No. Should incorporate the SafeTRAC into the instrument panel of the truck. Put it into the dash for driver's line of sight It would be better somewhere in dashboard.

Driver: No. Too much distraction on dash area.

Driver: No. The box was distractive and blocked my view of the Dolly mirror.

Driver: Yes. Not too bad. But maybe better off mounting it to one side.

Driver: Yes. Need to position the wires in a better way if SafeTRAC is installed permanently.

Driver: No. It blocked my mirror view

Driver: No. Interfered with the location of CB radio

Driver: Expressed concern about keying the radio microphone for any length of time. In the Volvo his CB radio was mounted under his SafeTRAC, and it interfered with SafeTRAC's displayed hash marks indicating his truck location within the lane. Keying the CB microphone caused SafeTRAC vehicle position indicator to go to one side or the other, or to the middle. He would purposely key the microphone and cause this to happen and look at the display to break up the monotony of driving. He found that when he talked on the CB, the SafeTRAC would beep. It needs RFI shielding.

Q. 22. Operation of SafeTRAC was consistent and understandable?

Summary of results: A total of 20 drivers wrote "yes" in answer to this question. The remaining 6 drivers responded "no".

Comments summarized from Drivers:

Driver: Yes. Did not like it at all

Driver: No. In bad weather "Rain, Snow, Fog" it was not accurate.

Driver: No. It seemed to beep even when not crossing or nearing lines on the road. It even beeped when the truck was stationary.

Driver: Yes. It beeped too much – SafeTRAC score #'s were in the mid 80's. He liked the lane displacement display; he mentioned liking it 3 times, it told you right where you were.

Driver: I found when talking on the C.B. it would beep.

Driver: No, sometimes it would pick up lines that were not there.

Driver: No. Couldn't figure out how to turn volume down so at night I turned SafeTRAC off.

Driver: Yes, I hate the **LOUD** beep. It gave me a headache the first couple of days.

Q. 23. The SafeTRAC numeric display could be read easily?

Summary of results: A total of 25 drivers (96%) responded "yes", that the numeric display could be easily read. One driver (4%) responded "no"

Comments Summarized from 8 Drivers:

Driver: Yes, distracting. Get rid of cursor.

Driver: Yes, install RFI shielding or get rid of it. It interrupted voice on radio. And it shut off at low speed.

Driver: No, not during the day.

Q. 24. SafeTRAC's numeric indicator (1-99) frequently got my attention while driving?

Summary of results: A total of 19 drivers (73%) responded "yes" to this question, and 7 drivers (27%) answered "no".

Comments summarized from 10 Drivers:

Driver: No, not really.

Driver: Yes. Attained scores as high as 95.

Driver: No, he said the SafeTRAC beeped too frequently. He wanted to rip it out of his truck. It could not differentiate too many things, situations like city street markings where there were too many painted lines to cope with. It was an annoyance.

Driver: Yes, if lanes narrowed, the display would still show a wide lane. It would attract my attention.

Driver: Yes. When tired it did tell you that you were. But, it's a little too sensitive, e.g. in Detroit it beeped too much, and after a while you shut it out of mind.

Driver: Yes. I kept looking at it to see what it was reading.

Driver: No, I found it would say "clean window" even when the window was clean.

Driver: Yes, I tried to stay in center of lane. I got scores of 98 for a long time. My lowest #s were about 83; I would strive for a score of 99, but couldn't get it. He looked at numbers a lot; his highest score was "98." He was trying to keep the numbers high, like a computer game, and to control it with not much beeping; it never beeped at him. After the first day it beeped. He claims to have actually obtained a score of 98 for as long as 15 minutes, and even for as long as a full hour.

Driver: Yes! I ride close to the white line and it made me see just how close I really do ride.

Driver: Yes. I kept trying to get a higher score.

Driver: Yes, the highest score I could get was 98. It seems that the higher the number, the harder it was to move up a point.

Rating scale from 1 to 5 (used for questions 25 through 27)

1 **2** **3** **4** **5**
Strong dislike/ **Not satisfactory/** **Neutral** **It's helpful/** **Very helpful/**

Needs much It needs some I like it I'd Use it
improvement **improvement** **about it**

Q. 25. SafeTRAC's *crossing the lane* alert feature could be trusted

Mean rating following the **Feedback Condition = 3.36** (n = 25)

Driver comment: N/A it wasn't set properly when uncovered, and the alarms didn't go off.

Q. 26. Displayed information provided was reliable; the display usually accurately depicted my driving with regard to tracking the lanes on the road?

Mean rating following the **Feedback Condition = 3.50** (n = 25)

Driver comment: I rate it a 2. Not in the day, display could not be read.

Q. 27. SafeTRAC warned me of poor lane tracking only when I thought it was appropriate?

Mean rating following the **Feedback Condition = 2.96** (n = 26)

Summarized comments from 2 Drivers:

Driver: Rated it a 1. Warned me at inappropriate times. This driver favors driving on the right side of the road. He does not get wind drag from a 2nd truck passing and the trucks weave. So you pull your truck to the right side to give other passing trucks room.

Driver: Rated it a 3. Warned me all the time.

Q. 28. SafeTRAC helped me drive more safely?

Summary of results: 18 drivers (69%) responded "yes". The remaining 8 drivers (31%) responded "no". Representative comments follow.

Summarized comments from 19 Drivers:

Driver: Yes, it made me more aware of what I was doing.

Driver: Yes, because when I'm tired now I stop and make a nap sleep (break).

Driver: Yes, I tried to keep truck from drifting.

Driver: No, it would only be good if I was sleepy and wandered on the road.

Driver No, there was not enough room to move between lanes before it would go off (beep).

Driver: No. The lines and lanes are not painted the same everywhere; so it would beep in places it should NOT.

Driver: No. In bad roads and bad weather in Indiana, with a single lane cleared, you could not stay in lane; SafeTRAC beeped a lot.

Driver: Yes. It kept me more aware of how I was driving on the highway and it kept me between the lines.

Driver: Yes. I have a thing for riding close to the line.

Driver: Yes. It kept you aware you were in the lane.

Driver: No. It keeps you more on your toes

Driver: Yes. I stopped riding so close to the line. I am now more Center.

Driver: Yes. It kept me with in lane markers.

Driver: Yes. It kept me using signals much more often.

Driver: Yes. I learned more about my driving skills.

Driver: Yes. It kept me more one the ball; I was better on my driving.

Driver: Yes. It was good to see how I drive.

Driver: Yes. It made me aware of the wandering I was doing. I didn't realize it.

Driver: No. I didn't watch my mirrors as much trying to make sure I was in the lines.

Q. 29. SafeTRAC helped me avoid a potential accident?

Summary of results:

Answer Yes: 22 drivers

Answer No: 3 drivers

Answer blank: 1 driver

Driver comments:

Driver: No. But it warned me a couple of times of other vehicles in my right of way.

Driver: Yes Alarm would sound when I'm picking up something on floor.

Driver: Yes. It always warned when something was beside me where I couldn't see.

Driver: No. How about maybe, sometimes before you might get mighty close with the trailer to something else, and not know it.

Q. 30. SafeTRAC's alertness index helped me decide when to take rest breaks?

Summary of results:

Summary Totals for Q. #30:

Answer Yes: 12 drivers

Answer No: 14 drivers

Summarized comments from 11 drivers:

Driver: No. I did not need to take a break – my shift was not long enough to really take a break.

Driver: Yes. It is excellent

Driver: No. Normal break every 2-3 hrs. not including lunch.

Driver: No. Sometimes it would go off after only 2 1/2 hrs driving.

Driver: Yes. It helped in confirming my opinion of my own level of alertness – it did show me that being tired, one did weave more often in lane.

Driver: Yes. It show me once to take a break.

Driver: Yes. Mostly I knew when I needed a break.

Driver: Yes. When excessive warning beeps occurred I stopped to take break or rest; I found that when warning beeps became obnoxious, I was usually tired and short tempered.

Driver: Yes. When I couldn't keep it down the straight and narrow it was time to stop.

Driver: Yes. Once when I did not pay attention to myself it reminded me that it was time to stretch.

Driver: No. I am a city driver; breaks depend on my loads.

Q. 31. I would like SafeTRAC installed in my truck?

Summary of results:

Answer Yes: 13 drivers

Answer No: 11 drivers

Answer both yes and no: 1 driver

Driver comments:

Driver: Yes. It's very good to stay straight on the road.

Driver: Yes & no. I liked it; but after awhile it got a little bothersome.

Driver: Yes. If it's adjusted accurately, it would help. If set up properly – to driver's discretion.

Driver: No. Its no good. I think its no good in the format it's in, and needs a lot of improvement before I want it in my truck.

Driver: No. You got to drive 100% all the time or it beep at you. It is very hard to drive 10 hours at 100%.

Driver: Yes. I liked it very much. I really enjoyed it. And if they fix the beeping; the beeping could be quieter. I could get used to having this in the truck. It's easy to use and in an easy spot to get at. I like the idea that SafeTRAC alerts the driver that he has left turn signal "on" and SafeTRAC alerts him if he forgets to turn off the turn signal.

Driver: Yes. I think I would if it was consistent.

Driver: Yes. It would be very helpful in heavy city traffic.

Driver: No. I did not like the beeping at night. Frequently it disturbed my sleep.

Experimenter note: in this study the FMT systems were always "on" when the truck was Power up; so for example the FMT devices, like SafeTRAC had power on while a driver slept with the truck power turned on.

Driver: No. I wouldn't want one in my truck because of the beeping noise. It beeped even when I was changing lanes.

Driver: Yes. This of all the things in the study I thought the most useful.

Driver: No. Too many distractions.

Driver: No. DEFINITELY NOT !!! unless beep is quieter. It needs to have a switch for city/highway driving. City roads are much narrower.

Q. 32. I would recommend SafeTRAC to fellow truck drivers? ____ yes ____ no

Summary Totals for Q. #32

Answer Yes: 17 drivers

Answer No: 6 drivers

Answer both yes and no: 1 driver

Answer blank: 2 drivers

Overall comments or recommendations regarding the SafeTRAC system?

Driver: Yes. He said it was a good system. He liked it in Ottawa, where while it was snowing, the SafeTRAC picked up the perimeter markers, (roadway shoulders) even while there were no lanes to be seen. He could keep it to 80-90 on display.

Driver: Yes. For the fatigue and safety on the road, it could be help every driver.

Driver: Yes. It is a good system to have and it might help reduce impairment on the road due to being sleepy.

Driver: Yes.. Its good at night on the highway. Enjoyed SafeTRAC very much.

Driver: Yes.. I think a lot of drivers would like it in the truck.

Driver: Yes.. It's very good. Very good and useful.

Driver: Yes. I liked it. He said of all FMT devices he really liked operating with the SafeTRAC. It kept him more attentive to his driving. He mentioned reaching down to pick something off the floor and SafeTRAC beeped at him. It beeped at him at shoulder of road too.

Driver: No. It did not do well tracking at night with heavy spray (rain).

Driver: No. Annoying beeps when vehicle passes in front even when stopped in the parking lot. It's too big. The curser is annoying.

Driver: No. It's no good.

Driver: Yes and no. When you need it, like in bad weather, that is when you can't rely on it. So why have something in the truck that works only when conditions are perfect?

Driver: No. I didn't like it, and I found the SafeTRAC display useless during the day.

Additional SafeTRAC comments from debriefing interviews :

Driver: Out of all the FMT devices he liked SafeTRAC the best—he has high 80’s late at night, early in AM, “yep I’m over the line most of times”

Driver: This I liked the most. It really showed how much I wander without realizing it

Driver: The SafeTRAC read out display should be directly in front of drivers. Line of sight; built into the dash.

Driver: SafeTRAC is a great system. I want one in my personal vehicle

Driver: There are too many distractions for SafeTRAC equipment to handle. Can’t tell differences in construction zones or sudden changes, especially when you are being crowded due to other traffic.

Driver: In traffic it’s of no use, SafeTRAC was beeping away & if goes off too often you ignore it, went off a few times when stationery)

Driver:, SafeTRAC should check if a driver’s performance score number say 85, had dropped to 80 units over a short time, and then it should beep as a warning to the driver. The driver could then push a button to acknowledge the alert. For example, because of construction scenes. It improves one’s driving.

Driver: said, that on truck #1868, SafeTRAC beeped and then displayed “clean window” – at least 4 times per night; rained off and on and still displayed “clean window” even though it was clean. His lowest number was about 71. With a solid painted line on the road SafeTRAC would beep once; with a broken line, it beeped 3 times.

Driver: he rated SafeTRAC a “5” of 10; said SafeTRAC coincided well with his level of fatigue, it confirmed his level of fatigue; “it made me more conscious of lane centerness than I was before and it pointed out my bias towards driving at edge of road”

Driver: He says it would be a good idea if drivers are tired, to stop and rest, but they won’t. So his suggestion is since they already have a computerized governor on their trucks which limits their speed to 102Km or 62mph, then one could design an accumulator in conjunction with SafeTRAC to re-set the maximum truck speed to about 45mph when drivers’ performance demonstrates they are tired. If that happens most drivers would give up and quit driving, forcing them to rest.

Driver: In a couple of places in Windsor with narrow road lanes, it beeped sometimes. He is still unsure of the pros and cons of SafeTRAC.

Driver: says he had little to no night time driving, and thus when he left in the early dark morning at 0530 hrs, his SafeTRAC system did not appear to be on.

Driver: When truck is parked at idle, SafeTRAC beeps occasionally as people walk by. SafeTrac needs a switch for the truck idle condition to permit drivers to shut SafeTRAC off or down, and at least to turn down the volume, or drivers will turn it off if they don’t like it.

Driver: About every 3 hrs SafeTRAC display told this driver to take rest breaks, and he thought that was excessive.

Driver: I like the idea that something would beep when you crossed a line. I tried to adjust the volume on SafeTRAC and I went thru the sequence of button pushes, repeatedly. It was jumping around for about 4 hrs until I shut down the truck. It must have to be re-initialized or re-booted like a computer.

Driver: Concerning the mount of the SafeTRAC camera on Freightliner cab, it rocks a lot. On some roads the rocking of the cab back and forth caused SafeTRAC to beep. Could you mount SafeTRAC in the grill or front bumper? My SafeTRAC scores ranged of scores 73 to 95/96; averaged 85-95 in cities. I tried to get it higher. When my scores went low I saw it print out "Take a break" right before I was planning a break. During the last 2 weeks of his driving, with SafeTRAC feedback condition, he regularly hauled 65K – 75K lbs. of freight.

Driver: SafeTRAC is noisy, the way it is. I don't like it at all. You can't change the too loud volume. Mostly on 2-lane highways it picked up the narrow lanes, and it beeped too long and too often. A black strip of tar was detected as painted lane lines. If you put the sun visor down you have to be sure to get the cable back in place right.

Driver: On SafeTRAC: It doesn't react well in ramps; nor in construction zones where lines are haphazard.

Driver: I most liked the fact that if you don't do a turn signal before a lane change, SafeTRAC beeps and lets you know that. It squawks. It doesn't relate to fatigue, because he doesn't wander in his lane. It just felt good to know it was there to remind him. You could design it for turning it off when the driver is facing narrowly painted lanes.

Driver: wants SafeTRAC noise defeats and options; like deciding what kind of rings on cellular phone control beeps one would prefer. SafeTRAC made me aware of my driving habits: where I was in a lane and it made me want to improve my skills. She liked Safetrac the best.

Driver: SafeTRAC does not work well on faded roadway paint. It did pick up the contrast between paved road and gravel.

Driver: SafeTRAC places too much emphasis on crossing lines. That is TOO LATE! That's just before an accident.

After rating SafeTRAC a "9" out of 10, he said that if he was getting tired, he'd consult SafeTRAC for feedback. Wants it to be fixed so when a driver deviates 10%-15% it alerts him. He figured out how to use push buttons to defeat the beeping sound; he had to re-set the SafeTRAC system to get his display on showing the vertical hash marks etc. In Freightliner Truck 2051 his CB, AM & FM radio & TV signals were not good reception. Some SafeTRAC beeping was experienced, suggesting some electrical interference with the other FMT test instruments and with the truck radios.

Driver: SafeTRAC was a real eye opener, and I made a stronger effort to keep my truck driving straight on the road. It grades you, so you know if you're doing a good job. On a scale of 1 to 10 he rated SafeTRAC an "eleven," as he liked it the best and was really happy with it. No alarms. No beeping, etc. and so he liked it.

Driver: She did not see the hash marks displayed on device. (Not sure if the display was set up properly for her or not). She used her SafeTRAC scores of 80's -90's to determine where the truck was in the lanes, and to give indications of her performance. SafeTRAC beeped in construction areas. She would like to see something other than so many "beeping" alarms in the truck cab, which include the truck's air warning device, her alarm clock, her wrist watch, her phone, her CB - and that is too many things that go "beep" in her truck.

Driver: SafeTRAC beeped a lot in cities. She would get scores of 94-95 on the open road for miles. But in the city, too narrow driving conditions. She rated SafeTrac a "7-8" on a scale of 1 to 10. She found SafeTRAC helpful in some respects and in some respects it was annoying.

SECTION D: CoPILOT (PERCLOS) MONITOR AND DROWSINESS DISPLAY

Please rate the PERCLOS alertness index system

Q. 33. The PERCLOS Eye Camera position on the truck dashboard distracted me?

_____ yes _____ no

Summary for Q. No. 33:

Answer YES: 8 drivers

Answer No: 17 drivers

Answer Blank: 1 driver

Driver comments:

Driver: No. I kind of got used to it.

Driver: No. Unless you look at it you do not see it. He said the IR red light was a bit of a distraction and it should be off to the side so drivers don't see it. He said most of the time he did not even notice it. He did not want to look at it because it was a distraction.

Driver: No. He didn't get it in eyesight and so it was not a distracter.

Driver: Yes. Too big. Don't like the flashing.

Driver: Yes.. More so when tired and at nighttime

Driver: Yes. The red flashing light.

Driver: Yes. At night, the red lights flashing.

Driver: Yes. In the beginning the red flashing lights did bother me.

Driver: Yes. Pulsing at night was distracting.

Driver: Yes. Only at first – got used to it quickly.

Driver: Yes. The flashing light should be changed to solid.

Q. 34. The PERCLOS numeric display could be read easily? ___ yes ___ no

Summary for Q. #34:

Answer Yes: 24 drivers

Answer No: 1 driver

Answer Blank: 1 driver

Driver comments:

Driver: No. I think the numbers could be a little bigger.

Driver: Yes. It seemed to never leave 100% unless camera was turned right away from my eyes.

Driver: N/A. It was not working for me.

Q. 35. PERCLOS Operation was consistent and understandable? _____ yes _____ no

Summary for Q. #35:

Answer Yes: 21 drivers

Answer No: 4 drivers

Answer blank: 1 driver

Driver comments:

Driver: No. I'm really not sure what it's supposed to do.

Driver: No. Sometimes #'s would read low.

Driver: No. The LCD readout was not consistent.

Driver: No. For some reason it would read low (45-50) or high (100%) for no apparent reason.

Use the following 1 to 5 rating scale to answer Q.s on the PERCLOS alertness index system (based on monitoring your eye lid droop)

1	2	3	4	5
Strong dislike/ Needs much improvement	Not satisfactory/ It needs some improvement	Neutral opinion	It's helpful/ I liked it about it	Very helpful/ I'd use it

Q. 36. The PERCLOS alertness index display was usually a pretty good match to the way I felt: alert or fatigued? 1 2 3 4 5

Mean rating following the Feedback Condition, (after completing 4 weeks of driving in the study) 25 drivers' responses rated an **average score of 2.92**

Q. 37. PERCLOS alertness index digital display information was usually accurate/reliable

Summary Q. 37 data from Feedback Condition condition, (after completing 4 weeks of driving in the study) 23 drivers' responses rated an **average score of 2.91**

Q. 38. Sometimes the display indicated my eyes were drooping, while I felt fully awake/alert

1 2 3 4 5

Summary Q. 38 data from Feedback Condition, (after completing 4 weeks of driving in the study) 24 drivers' responses rated an **average score of 3.21**

Q. 39. The PERCLOS alertness index information was helpful to me in monitoring my own level of alertness and/or drowsy periods?

1 2 3 4 5

Summary Q. 39 data from Feedback Condition, (after completing 4 weeks of driving in the study) 23 drivers' responses rated an **average score of 3.00**

Q. 40. As PERCLOS monitored me for alertness and/or drowsy driving, it made me feel safer? _____ yes _____ no

Summary of Q. #40:

Answer Yes: 5 drivers

Answer No: 19 drivers

Answer blank: 2 drivers

Driver comments:

Driver: No. It didn't make me feel safer. It confirmed when I needed to rest.

Driver: No. The SafeTRAC was more effective to let me know when I was wandering.

Driver: N/A. I cannot say because it did not work for me or to indicate anything on the PERCLOS screen.

Driver: No. He mostly did not consult PERCLOS display. When he did, it read 92 to 100 score and he didn't know how to relate to that. He asked what's it mean?

Driver: No. The thing needs more testing, but I think it could be good in the future.

Driver: No. The display would show an average score, then I put sun glasses on and it would give a total different average. The same thing at night with anti-glare glasses, the average would change.

Driver: No. The PERCLOS said it was 100 a lot of time, maybe even when I was tired and sleepy. It would show a 100 but I was really tired. It did not match my feeling of drowsiness one day with only 4 hrs of sleep, but it still read 100 or 96 or 98.

Driver: Yes. I liked it. But the red lights were blinking on and off were hypnotizing (12 lights) and distracting. Quite often it went to 100, and then even while I was driving, it dropped to zero, for an eternity, and then climbed back up to about 76.

Driver: No. I think I can monitor myself pretty good by myself but it might be good for a back up. Sometimes PERCLOS went to zero and he claims it actually beeped at him.

Driver: No. The PERCLOS numbers were higher then what I felt. They did not reflect how I felt.

Driver: No. No mechanical device can truly tell you when you are over tired; therefore it would not make me feel safer.

Driver: No. Even when I felt tired the display showed 100%. Found camera moved too much with truck's vibrations.

Driver: No. I was not confident about the readings.

Driver: No. I don't think it was monitoring my sleepiness/fatigue level very well at all.

Driver: Yes. It always warned me.

Driver: Yes. All day it was reading 100. He wore sunglasses and got readings between 70's & 80's at nighttime. At night, at the same time SafeTRAC was beeping, PERCLOS seemed to indicate the same as it presented low scores of about 40 on PERCLOS, giving him confidence the 2 devices were tracking his level of drowsiness.

Driver: Yes. I'm not sure if mine was working correctly as numbers just seemed to be constantly different. Either that or my glasses interfered.

Q. 41. I would like to have a PERCLOS Driver Alertness monitor in my truck?

____ Yes ____ No

Summary of Q. #41:

Answer Yes: 7 drivers

Answer No: 18 drivers

Answer blank: 1 driver

Driver comments:

Driver: No. It's not that useful for me. When I started getting low readouts I was already looking and planning for a rest break.

Driver: No. I can't see if it good or not.

Driver: No. I was a little disappointed in the PERCLOS system. I didn't think it was reading accurately to the way I felt.

Driver: No. I did not like it – but others might.

Driver: No. He commented that PERCLOS went to zero and beeped at him and he did not think it should do either.

Driver: No. It would only be a distraction!

Driver: No. I did not like the flashing light.

Driver: No. As stated in last page, it needs more testing

Driver: Yes. It would help keep track of one's alertness in how good or bad.

Driver: Yes. If it's mandatory.

Driver: Yes. If it was accurate it would help

Driver: Yes. Helpful

Driver: blank Maybe If I could be built in.

Q. 42. I would recommend the CoPilot PERCLOS Driver Alertness monitor to fellow drivers? ___ Yes ___ No

Summary of Q. #42:

Answer Yes: 9 drivers

Answer No: 16 drivers

Answer blank: 1 driver

Driver comments:

Driver: No. In my case – I didn't see a great benefit in this technology.

Driver: blank I had difficulty setting it.

Q. 43. Driver's overall comments and recommendations on the CoPilot PERCLOS Driver Alertness Monitoring system:

Driver: Good system.

Driver: I did not really like it. More of a distraction than a useful device.

Driver: I would like to see it in vehicles to help acknowledge awareness of drivers and safety on the road for others.

Driver: Useless relaying on such equipment. It will cause problems instead of teaching and enforcing sound driving practices.

Driver: I think it's not bad but takes time to trust it. Something new, so maybe in the future

Driver: Need to know better how to interpret the scale when it works. Like I mentioned, if I drive without sunglasses it would give a reading of 34% to 76%. If I put glasses on it would read 100% - 80%(?) So is 34 -76 okay when driving without glasses and 100% - ? -with glasses?

Driver: It did not seem to coincide with my level of tiredness

Driver: Easy to read and did not distract from driving.

Driver: I did not have a chance to see PERCLOS working at night. I was driving in day light shift. Chattham to Windsor – it’s all open. This driver did not rate PERCLOS on a scale of 1-10 as he says he did not see it.

Driver: It needs to be put on a pivotal mount. At night the numbers were all over the place, 60’s, 70’s, or 100’s, and were meaningless. PERCLOS was not accurate.

Experimenter note: The PERCLOS mount in Freightliner was a different mounting arrangement from the Volvo. The shorter in stature women drivers had trouble getting the PERCLOS IR light display set for them. The pivotal mount needs a more adjustable range.

Driver: I really did not like PERCLOS. Found it distracting; did not like the red light. They need to go back to the drawing board on PERCLOS.

Driver: PERCLOS was good; but it bothers me at first with flashing of the circle lights. My driving started early morning at 3-4 A.M. PERCLOS would read 100% and did not drop. He ran with PERCLOS display at 90 a few times. The Air Ride seat on rough roads and the vibrations made it so the PERCLOS camera did not “see” his face consistently.

Driver: I feel PERCLOS is not accurate. It needs too much adjustment. I did not like it most of the time. 100% monitor moved around vibrated too much. He encountered some very rough roads, and the vibrations caused troubles with PERCLOS. He said the red light was too visible on display at night.

Driver: blank At 5’4” in height, this woman driver sits higher than she should, doesn’t like bouncing up and down, so she puts lots of air in seat and she cross her legs on the seat. In the Volvo truck it moved sideways, but not up and down. PERCLOS rarely moved from a score 100 unless she turned her head.

Driver: Need to insulate PERCLOS pulsing from interfering with the A.M. radio (RFI problem). The PERCLOS didn’t work so well, much.

Driver: PERCLOS should be mounted away from sight line to the right fender mirror. It blocked my view. He found using PERCLOS useless. He got readings of 40s, sometimes 90s to 100 most of the time. He trained drivers, and observes that most drivers don’t check their gauges. Drivers will not check oil engine pressure, air pressure, water temperature. The general “check the gauge” routine. So why would you expect them to check this PERCLOS display?

Driver: With the no-feedback shroud “on” the displays, he fussed with aiming the PERCLOS IR lights display, but he did not find it easy.

Driver: I thought PERCLOS was supposed to show when my eyes were closed. So for a fatigue alertness device I didn’t know that this was what it was supposed to be doing. PERCLOS didn’t measure when my eyes are open or closed. It measured my fatigue at 90 or 100 every time.

Driver: PERCLOS doesn’t work in the day. It should be mounted from above for better daytime usage. The red lights flashing were a constant distraction at night. He’ll usually

keep low red lights on near the floor of the truck cab at night, but they don't "flash;" whereas PERCLOS did flash red lights at him and he found that to be a distracter. "Until perfected, it is just a horrible flashing neon sign on the dash."

Driver: The numbers seemed to be all over the scale. Sometimes I felt good, but the PERCLOS numbers were low. Other times the opposite. But not always.

Driver: This driver rated PERCLOS a "1" on a scale of 1 to 10. She said she has lazy eyes. The flashing red light was distracting - the reading stayed at 100 most of the time, and she found it not helpful.

Driver: This driver rated PERCLOS a "2" on a scale of 1 to 10. She indicated the PERCLOS scores did mean much. What do they mean? She wore light diffusion glasses and at night.

SECTION E: HOWARD POWER CENTER STEERING SYSTEM (HPCS):

Please rate the Howard Power Center Steering System (HPCS)

Q. 44. Operation of the HPCS was consistent and understandable? _____ yes _____ no

Summary of Q. #44:

Answer Yes: 23 drivers

Answer No: 2 drivers

Answer blank: 1 driver

Driver comments:

Driver: Yes. Great system.

Driver: Yes. It is the best invention that was made to reduce fatigue and stress, and be able to be more relaxed.

Driver: Yes. It performed pretty well as explained.

Driver: Yes. He was a rally driver, close ratio rack & pinion. Lot of rain & wind past 2-3 days. Close ratio rack and pinion 1 ½ turns uses 2 ½ times less turning of wheel with HPCS.

Driver: Yes. When the truck was "heavy," it did not hold it as much; so then he upped PSI to 140 PSI.

Driver: Yes. He loves the HPCS, as it made steering and driving a lot easier. He took his hands off the steering wheel and the truck stayed true and straight. Even going through

Michigan with bumpy roads and winds, I really liked HPCS, and it wouldn't have been as straight without it.

Driver: Yes. He really enjoyed it, it really took stress off the arms, I really enjoyed it – he shut it off to see difference and he had to wrestle the steering wheel more.

Driver: Yes. He rates HPCS a definite 9 out of 10; nothing is perfect so not a 10. He enjoyed HPCS.

Driver: Yes. Okay on some roads

Driver: No. For the first week HPCS made no real difference. For the second week I didn't drive the truck a whole lot. I would like to try a steer-tire blowout to see if the HPCS works or not.

Driver: No. Sometimes I could not get used to it.

Q. 45. The use and location of HPCS controls/displays were good? _____ yes ____ no

Summary of Q. #45:

Answer yes: 13 drivers

Answer no: 12 drivers

Answer blank: 1 driver

Driver comments:

Driver: Yes.. Easy to read and use.

Driver: Yes. They were excellent if found, the 1st time, I used it, I was amazed at the difference.

Driver: Yes. Considering it was a temporary mounting – the gauge light reflected off windshield at night.

Driver: No. It requires too much looking. Suggest mount them in the steering wheel. Make a left/right button (perhaps an arrow) to apply more pressure. He wants better controls design: human factors engineering.

Driver: No. The controls got in the way of the gear shift on the side of the seat.

Driver: No. 1st & 6th gear were interfered with on Truck #2051.

Driver: No. A shorter person commented that positioning of the controls for the HPCS in the Freightliner truck was a safety hazard interfered with gear shifting. I stalled several times. I couldn't get into 1st or 6th gear.

Driver: No. On Freightliner controls should not be on the side of seat. It is in the way of shifting.

Driver: No. Had to take my eyes off the road to adjust or reset the controls.

Driver: No. I would rather have it on the dash.

Driver: No. Radiates heat against legs.

Driver: No. I drove a Freightliner, and controls were located on the side of seat, which interfered with shifting gears.

Driver: No. I was always catching on the HPCS controls while going to the sleeper berth bunk.

Driver: No. I didn't like them on the lower right hand side of the seat. It was very hard to see the controls while driving.

Driver: No. Needs to be dash mounted controls.

Driver: blank She set HPCS at 110 PSI and struggled with it. She spent too much time fussing with it; and so she turned it off. She commented she also could not use a cell phone with the HPCS on.

**Q. 45a. On average, at what pressure level did you set the HPCS to drive?
____ PSI in crosswinds? _____ PSI in more normal conditions?**

Driver #001: 160 PSI in cross winds
120-1130 PSI in normal conditions

Driver #002: 135 PSI in cross winds
120-125 PSI in normal conditions

Driver #003: 160 PSI in cross winds
160 PSI in normal conditions

Driver #004: 140 PSI in cross winds
130 PSI in normal conditions

Driver #005: 160 PSI in cross winds
140 PSI in normal conditions

Driver #006: 160 PSI in cross winds
140 PSI in normal conditions

Driver #007: 140 PSI in cross winds
130 PSI in normal conditions

- Driver #008:** 125-130 PSI in cross winds
125-130 PSI in normal conditions
- Driver #009:** 132 PSI in cross winds
132 PSI in more normal conditions
132 PSI was as high as it would go but it was working.
- Driver #010:** 135-140 PSI in cross winds
130 PSI in more normal conditions
Drove mostly 130 PSI—Took it up to 140 PSI at times.
- Driver #011:** 160 PSI. in cross winds
140 PSI in more normal conditions
- Driver #012:** 140 PSI. in cross winds
130 PSI in more normal conditions
“I had a lot of cross winds every day all the way to Windsor, and set HPCS at 135 PSI usually. It was still bad to move the wheel, but it really helped a lot. It felt stiff in steering. Even with heavy loads it worked well. But with 70K lbs the winds moved him over. He had 70,000 lbs loads the last 3 days.”
- Driver #013:** ___ PSI. in cross winds
140 PSI in more normal conditions
- Driver #014:** Driver withdrew from study
- Driver #015:** 130 PSI in cross winds
130 PSI in normal conditions
- Driver #016:** Driver withdrew from study
- Driver #017:** 140 PSI in cross winds
140 PSI in normal conditions
- Driver #018:** 90-100 PSI in normal driving conditions
- Driver #019:** (Driver writes: What crosswinds? I had none!
(Driver writes: First week 140 PSI; second week 200 PSI)
- Driver #020:** 140 PSI in cross winds
140 PSI in normal conditions
- Driver #021:** 140 PSI in cross winds
140 PSI in normal conditions
- Driver #022:** 120 PSI in cross winds
125 PSI in normal conditions

Driver #023: ___ PSI in cross winds
 ___ PSI in normal conditions

Driver #024: 160 PSI in cross winds
 140 PSI in normal conditions

Driver #025: ___ PSI in cross winds
 160 PSI in normal conditions

Driver #026: ___ PSI in cross winds
 ___ PSI in normal conditions

Driver #027: ___ PSI in cross winds
 ___ PSI in normal conditions

Driver #028: ___ PSI in cross winds
 120 PSI in normal conditions

Q. 46. Was the HPCS steering assistance helpful in my driving? _____ yes _____ no

Summary of Q. 46:

Answer Yes: 20 drivers

Answer No: 4 drivers

Answer Blank: 2 drivers

Driver comments:

Driver: Yes. more free

Driver: Yes. Because it saves fatigue on my shoulder and neck, when you got a cross wind.

Driver: Yes. Very helpful once it was set good.

Driver: Yes. Only in winds. But on very rough roads it did not work -- too much bouncing. When roads have grooves in them, or potholes, it's less effective.

Driver: Yes. It helped more with light loads.

Driver: Yes. Worked good in crosswinds.

Driver: Yes. It takes time to relax and trust it.

Driver: Yes.. It really controlled truck while driving.

Driver: Yes. It lessened the strain in my shoulders and neck.

Driver: Yes. It worked pretty good, did not use it all the time, like cruise control I did not trust using it all the time.

Driver: Yes. In crosswinds it was very helpful. I didn't even realize they were there.

Driver: Yes. On open road did not use it in city driving.

Driver: No. I really did not like the way it pulled the truck.

Driver: No. Truck still wanted to pull to one side depending on the grade of the road.

Driver: No. Road conditions (curves, crown, yaw) meant continual "trimming."

Q. 47. HPCS made my driving workload easier? ____ yes ____ no

Summary answers to Q. #47:

Answer Yes: 19 drivers

Answer No: 7 drivers

Q. 48. I felt comfortable using the HPCS? ____ yes ____ no

Summary of Q. #48:

Answer Yes: 20 drivers

Answer No: 5 drivers

Answer both yes and no: 1 driver

Driver comments:

Driver: Yes. I like it because it took a lot of tension off my shoulders and neck.

Driver: Yes. A little less strenuous on shoulders.

Driver: Yes. The system worked well, always consistent.

Driver: Yes. Got very used to it after about 2 hours.

Driver: Yes. Only in winds.

Driver: Yes. Had to use less hand control and I felt more at ease

Driver: No. I was still trying to fight it.

Driver: No. Felt I had to correct steering more often. Had to reach for the controls.

Driver: No. Due to extra pressure on steering wheel at parameter of setting – arms & shoulders fatigued earlier.

Driver: Yes and no. On the highway, yes. In the city, no it's useless.

Q. 49. HPCS improved my truck steering or ability to maintain direction?

_____ yes _____ no

Summary of Q. #49:

Answer Yes: 18 drivers

Answer No: 5 drivers

Answer both yes and no: 2 drivers

Answer blank: 1 driver

Driver comments

Driver: Yes. You go straight all the time when there is a crosswind. It's easier to drive with it.

Driver: Yes. It worked pretty good in ruts on the highway.

Driver: Yes. It improved my truck steering or ability to maintain direction, -- but mainly on very long straight roads

Driver: Yes.. More so when tired.

Driver: Yes.. Sometimes, a few times, I was fighting it when I was tired.

Driver: Yes. On smooth roads like interstate highways. On state routes you need more attention.

Driver: Yes. and no Depending on how bad the conditions were.

Driver: Yes. and no In the city or in a parking lot I turned it off; too much force is required to steer in small places.

Driver: No. He said when you're driving in a straight line you're okay, but when you need to change lanes you gotta fight it. He calls this the "wall of resistance concept" He

left the HPCS “off” the second and last week of his participation, didn’t want to challenge it?

Driver: No. It stiffened steering a bit.

Driver: No. Fought to compensate for other drivers crossing over my side of road.

Driver: blank I often felt like I was fighting steering.

Q. 50. HPCS was helpful driving in crosswinds? _____ yes _____ no

Summary of Q. #50:

Answer Yes: 21 drivers

Answer No: 4 drivers

Answer blank: 1 driver

Driver comments:

Driver: Yes. Very helpful in strong crosswinds.

Driver: Yes. Go straight all of the time.

Driver: Yes. He kept HPCS set up higher than 140 PSI most of the time. He said he hopes his employer, Challenger, will buy HPCS.

Driver: Yes. Except in excessive strong crosswinds but still better than without it.

Driver: Yes. Easy to hold straight line. However in inner city driving he turned it off.

Driver: Yes. Did not have a lot of crosswinds, but when it did it seemed to work okay.

Driver: Yes. In extreme condition it did not help. I drove in crosswind of 25-30 mph with peaks of 40-+ and I had to turn HPCS off.

Driver: Yes.. Less moving of steering wheel.

Driver: Yes.. Adjusted it and was amazed how it controlled truck.

Driver: No. Any disturbance in the crosswind (trees- underpasses, passing trucks) and I had to trim HPCS, or hold wheel to outside of “rut.”

Q. 51. HPCS always worked in a helpful manner? _____ yes _____ no

Summary of Q. #51:

Answer Yes: 18 drivers

Answer No: 8 drivers

Q. 52. How did HPCS affect my driving on curves?

_____ helped _____ hindered _____ no effect noticeable

Summary for Q. #52 (HPCS on curves):

Answer helped: 10 drivers

Answer hindered: 8 drivers

Answer no effect noticeable: 8 drivers

Driver comments:

Driver: (hindered) She often found safe track would go off more when going around the curves because HP would be trying to hold the truck straight. Also found that system required 2 hands on wheel to keep it straight.

Q. 53. Was HPCS helpful driving in straight-aways?

_____ helped _____ hindered _____ no effect noticeable

Summary for Q. #53 (HPCS on straight-aways):

Answer helped: 20 drivers

Answer hindered: 3 drivers

Answer no effect noticeable: 3 drivers

Q. 54. HPCS reduces driver fatigue? _____ yes _____ no

Summary for Q. #54 (HPCS reduces driver fatigue?):

Answer yes: 14 drivers

Answer no: 8 drivers

Answer, not sure: 1 driver

Answer, did not notice, or blank: 2 drivers

Answer, yes and no: 1 driver

Driver comments:

Driver: Yes. A lot since 2 weeks ago, as soon as HPCS was on, I have had no fatigue on my neck and shoulder.

Driver: Yes. Driver said he really liked HPCS. Unsolicited he asked us to talk Challenger into buying HPCS for their trucks.

Driver: Yes. I noticed it helped me a lot.

Driver: Yes. Lot less strain on shoulders.

Driver: Yes. In winds driving effort was the same as it would be on a calm day. When bringing up the HPCS pressure the truck wants to go with the crown of the road. He says HPCS needs more bad weather testing.

Driver: Yes.. Where in low speed more effort was required or one has to switch the HPCS have to "off."

Driver: Yes. Less arm & hand use and felt more relaxed. Less stress

Driver: Yes. Sometimes it would hindered me in a curve. He drove a Volvo and he could adjust the PSI easily. A lot of drivers would really enjoy the HPCS in their truck.

Driver: No. Some days it was okay, others I almost had to fight to keep truck on the road.

Driver: Not sure. I did not notice it.

Driver: No. It was helpful when adjusted right if not it made it harder. For fatigue it was a different fatigue, it's hard to explain in writing.

Driver: No. Much more eye, arm and shoulder fatigue.

Driver: No. Arms and neck hurt more with HPCS on.

Driver: Yes. and no I shut the system off one day and it was a great relief. But the days when bucking the wind it was great.

Q. 55. I would like HPCS in my truck? _____ yes _____ no

Summary for Q. #55:

Answer yes: 20 drivers

Answer no: 5 drivers

Answer yes and no: 1 driver

Driver comments:

Driver: Yes. More comfortable ride (no body roll) -- meaning the cab of the truck. He was really sold on HPCS.

Driver: Yes. Yes. Yes.

Driver: Yes. On A Long run it was helpful.

Driver: Yes. It gives more control with less effort on highway. Don't feel any winds from passing trucks or large units.

Driver: Yes. Mainly for long straight roads.

Driver #010: Yes.. I was amazed as to how it made driving easier and better to control the truck.

Driver: Yes. Sometimes I liked it, sometimes I didn't. I would need more time with it now. I never adjusted the pressure once and that could be a problem.

Driver: Yes. and no Driver said it works good in strong winds. Other drivers were wandering on road, while I was not because of HPCS.

Driver: No. I would like to test it in a steer blowout situation.

Driver: No. Stiffening of steering wheel response, and length of time to re-center, caused extra work.

Driver: No. A close ratio steering box would do as much better job.

Driver: No. When necessary to steer over solid line I need and I want to know that I have the control to prevent possible accident w/o fighting for steering control.

Q. 56. I would recommend HPCS to other drivers? ____ yes ____ no

Summary for Q. #56:

Answer yes: 22 drivers

Answer no: 3 drivers

Answer blank: 1 driver

Driver comments:

Driver: Yes. And I have!

Q. 57. Driver's overall comments or recommendations on the HPCS:

Driver: Every driver should have one, I'm sure it saves accidents and reduces fatigue.

Driver: I really enjoyed using the HPCS. It would be very useful in a team operation; cuts the left to right body roll by 70%.

Driver: Love it. Feel more in control of the truck.

Driver: I love it; would have it in my own personal vehicle if I was doing a lot of trailer pulling, knowing how it would work with ease.

Driver: Needs left/right switch to apply pressure when driver wants. Or build in a sensing monitor to apply more pressure when winds above certain speed are detected.

Driver: With better controls that light up at night so you can see the pressure and on the dash, I think it could be a good idea.

Driver: The Gauge gets hot to touch.

Driver: Needs to have governor to shut off at low speed as parking is difficult with it on.

Driver: Enjoyed it very much, felt more relaxed and less stress when using it.

Driver: It was easier on the arms when driving for long time. On a scale of 1 to 10 he rates HPCS a Definite 9, I enjoyed it.

Driver: Drivers need a longer adjustment period (training) to HPCS system She suggests: give longer training on HPCS. There was some confusion only over the settings on HPCS. One trainer (meaning from River City Products) said start at 130 psi and go higher; whereas the other trainer said start 130 psi and go lower.

Driver: Took the HPCS to 160 PSI most of the time, but using HPCS she loses some of the finger-hand control on the steering wheel, which she is used to, and she did not like that aspect of HPCS.

Driver: I didn't know how to make HPCS work, couldn't drive it hands off the wheel, but I tried that. Driver asks for longer training on HPCS. Expressed confusion over the psi setting on HPCS, as one trainer said start at 130 psi and go higher, the other trainer said start at 130 psi and go lower.

Driver: The HPCS is very helpful in crosswinds and when hauling heavy loads.

Driver: HPCS is an okay kind a thing: when grade drops too much to one side e.g. Highway 6. He said he hasn't used it long enough, only 2 weeks. The positioning of controls was lousy.

Driver: I think truck #1740 needs a wheel alignment.

Driver: If road conditions became bad – ice slush, loose gravel – I could not use HPCS – due to lack of “feel” when in the “ruts” caused by the centering activity. Not effective in highway cornering situations.

Driver: Sometimes I would turn HPCS unit off, then reset, and it was hard to tell the difference. He tried a lot of turning HPCS “on” and “off” to see the difference. He says you could get the same thing as HPCS if you designed in “close ratio steering” the ratio in gear box is higher the higher the number, the less steering you need it might cause drivers to over steer while backing up, pulling ahead at low speeds or backing up, it might adversely affect the steer wheel tires. He rated HPCS at 6 on a scale of 1 to 10.

Driver: HPCS is a good thing, but the controls need to be very visible to the driver, so adjustments can be made when necessary.

Driver: He rated the HPCS at 8 on a scale of 1 to 10. I really like it in certain things, but not in other cases because I wasn’t using it properly.

I probably had the HPCS set at 140 PSI all the time, as he said he doesn’t know what PSI HPCS was at, but he never changed it the whole time. He always drove w/HPCS “on.” He claims because of where the controls were positioned he could not see them. He shut HPCS off for one day just to see the difference and then turned it back on again.

He did trim the HPCS once in a while. When I shut off the HPCS it was a big relief the same experiences. He says you have to definitely see the HPCS display if for no other reason than you’ll be reminded of it and recall that the PSI can be adjusted. Perhaps this should be in his case with the controls in Freightliner positioned so low, adjacent to the seat, he barely remembered to fiddle with the controls, or adjust it.

Driver: Would need to be adjustable to account for different drivers. Rated the HPCS at 4 on a scale of 1 to 10. She says I thought it was taking control, and it bothered me. She trusts her feel and instincts and abilities more than a piece of machinery.

Driver: Rated the HPCS – 7-8 on a scale of 1 to 10. If things were fixed, if the HPCS is “fixed,” HPCS that is the one item she would like to have in her truck. My friends and I talked a lot about it. It could save lives. Front steer-wheel lock during a blowout, etc. Her truck was out of alignment at HPCS training, and it took 2 days to realize she could control the PSI level with the knob. Training was too short.

They told us the HPCS would help lessen neck and shoulder muscle fatigue & discomfort. I found the opposite. It caused more fatigue in neck & shoulders She turned it off in docking in towns etc.

Experienced an interaction w/HPCS causing truck to cross painted roadway lines in a curve when trying to control truck in that turning movement. Consequently the SafeTrac beeped because I crossed the line in negotiating the curve.

SECTION F: PSYCHOMOTOR VIGILANCE TEST (PVT) OF REACTION TIME:

Please Rate the Psychomotor Vigilance Test (PVT) of reaction time

Q. 58. I learned how to master the PVT pretty well, that is, I learned to consistently obtain pretty good reaction time scores? ___ yes ___ no.

Summary for Question #58: 18 answers: YES 8 answers: NO

Driver comments:

Driver: yes I seemed to be able to get 240-260ms consistency (If I was not distracted).

Driver: yes at times I got better and at times I was distracted for a second but overall, was good.

Driver: no It was hard to find a nice quiet place to do it.

Driver: no the longer the interval the better I did when rested – but not when fatigued.

Driver: yes I was believing it reflected any fatigue. I enjoyed it, liked it. It's a good Idea.

Driver: no concentration factor was an issue.

Driver: yes as long as I wasn't distracted.

Driver: yes when I am not bored of it. This test is too long. It would be 5 min. that would be okay.

Driver: yes easy to screw up when distracted.

Driver: no it seemed like the more I played the game the worse I got.

Driver: no I resigned myself to the fact that there was nowhere to perform the test without outside interference.

Q. 59. Was the PVT testing intrusive to my duty day? ___ yes ___ no.

Summary for Ques #59: 15 YES; 7 No; 2 yes & no; and 2 no answer

Driver comments:

Driver: yes sometimes I had no time to do test.

Driver: yes it gets boring every day.

Driver: yes. especially at end of day.

Driver: yes it took too long; and another driver said the test was too long.

Driver: yes somewhat when sleep time was intruded upon by this test.

Driver: yes only because of a very tight schedule on delivery. And border cross delays didn't help.

Driver: yes usually very busy or dead tired.

Driver: yes if I got sent home early, often I didn't do it.

Driver: no I didn't mind it too much, but when I was tired it was a very long 10 minutes.

Driver: no most days I didn't have time for it.

Driver: no He liked the PVT RT test, it got his imagination – found it to be damned accurate, great RTs. Of all FMT technology he liked PVT the best.

Driver: yes and no At times I didn't have time for it. But I forgot to do it a few times.

Driver: yes and no I did not like to use it at end of shift. It seemed to take forever.

Q. 60. Did the results of the PVT usually match my perception of my own reaction time?

___ yes ___ no

Summary of Q. 60: 19 YES 7 NO

Driver comments:

Driver: yes When the scores were higher I was more tired.

Driver: yes It was good when I pay attention but when lacking attention, for a second then not. I was not as quick. Overall pretty good.

Driver: yes Very onerous

Driver: yes. Gave consciousness to my own perception – was a good re-enforcer. Driver said he'd rate PVT an 8-9 out of a scale of 10, rated other FMT devices lower. He found PVT to be the best indicator of fatigue. He suggests design PVT into dash board and if driver can't do RTs, have it automatically shut down his truck.

Driver: yes He couldn't understand why he obtained low PVT scores in the morning. He got up at 4 AM, and took the PVT about 0500-0530; he did not take the PVT test in the middle of the driving day as he was instructed to do.

Driver: yes In the 3rd week I thought the scores matched my fatigue level quite well.

Driver: no It depended on my mood.

Driver: no Even when tired I still got the same score pretty much.

Driver: no When I was tired my reaction time went up. I think because I can focus on one thing tired, but when awake I want to know what is happening around me.

Driver: no I always thought I could do better, and it would frustrate me.

Driver: no Sometimes they recorded faster than when I first thought I saw flashes.

Q. 61. When I got slower reaction times on the PVT, it reflected my own overall assessment of my condition (e.g. tired/fatigued)? ___ yes ___no.

Summary of Q. #61: 19 YES 6 No; 1 yes & no

Driver: yes He says he lost track a few times about taking PVT test twice per day and might have missed a few tests. He left it home a few times. However, he did not mark those misses on his daily diary.

Driver: yes and no Sometimes I would get distracted while doing the test.

Driver: yes When that happened I noticed I was more tired than I had realized.

Driver: no On some occasions I was tired and I got a better time.

Driver: Yes. I did better at nighttime than in the morning.

Driver: yes When you are really fatigued, it shows

Driver: yes I found test to be far too long It made me feel tired.

Driver: no My disinterest played a big part.

Driver: yes The more tired the higher the numbers.

Driver: no Outside distractions, lots of people interrupted; a knock on the truck door to move it, etc.

Q. 62. In my opinion the PVT could be used as a personal checking system on driver fitness for duty system (e.g. to check for a driver's readiness to drive as he/she reports for duty, or at rest stops half way through a long trip)? ___ yes ___ no

Summary of Q. #62: 14 YES; 8 NO 1 yes & no; and 3 blank, no answer

Driver comments:

Driver: yes It was a good tool – but I think reaction time and tiredness are sometimes separate.

Driver: yes But we have to make a habit to do the test twice a day.

Driver: yes I think it's a good idea, but I don't think all the drivers would want to use it.

Driver: yes This would be a great help for this purpose. I would like to do it everyday because it tells a lot.

Driver: yes I was more tired at night and seemed to get better results.

Driver: yes When higher scores are recorded near the end of sessions it shows loss of concentration.

Driver: yes I'm not sure how others would react, but I would use it.

Driver: yes and no Can't decide.

Driver: no He said if such a RT test was required of drivers, he'd quit!

Driver: Fit for duty- no. In the middle on a long shift of driving: yes.

Driver: no It just proves some drivers are better at this "game."

Driver: no Anything could distract you and make you have a bad score.

Driver: blank Should make a shorter test; often would find scores increase.

Q. 63. Driver's overall comments or recommendations about the PVT reaction time monitoring system?

Driver comments:

Driver: Time consuming

Driver: Was very good and would recommend this unit for daily use by everyone in life.

Driver: It's as a reflex game, of little use. If I was that tired I would be asleep before I could use the PVT device. This driver said that sometimes he was just too tired to take the PVT test. Once his RT was 62.0 He disliked doing PVT right before sleep time.

Driver: People would get bored with it and not use it daily.

Driver: It was hard to match rest and do the test with my style of driving.

Driver: More variety on intervals required.

Driver: Was always trying to stay in the range of 200ms. I think that it is a good system to have drivers to check how tired you are.

Driver: Sometimes I just didn't want to do it. When I was done with my shift, I just wanted to go home.

Driver: Test too long. Don't have time during rest period to do test.

Driver: The PVT is hard to work in when you are riding on a tight schedule.

Driver: Too slow too long. Test was much too long, got very boring & monotonous.

Driver: At times it was difficult to find location void of distractions – difficult to get true findings.

Driver: I would like to see it used as a personal tester to ensure a driver has a benchmark to tell his fatigue level.

Driver: I found it was very boring.

Driver: It could be used but a lot of times it hard enough to take time to eat, let a lone anything else.

Driver: I've had more mental stimulation from my PS 2 games. Found the waits (loading/unloading) enjoyable and not tiresome.

SECTION G: GENERAL QUESTIONS FOR DRIVERS AT END OF 4TH WEEK OF PARTICIPATION

Q. 64. Driver's overall comments/recommendations about the testing, the alertness and fatigue management devices, driver fatigue, etc.

Driver Comments:

Driver: I learned a lot that will be useful. I think the program will get better as it goes along.

Driver: It's very good because now I stop when I'm tired and take a break or stop a couple hours.

Driver: I enjoyed doing this testing over the past few weeks.

Driver: I learned a lot of this program, of the ups and downs that it laid out. It helped me to find my weak points and my strong points as the day goes on in the driving field; or of any other activity in my daily routine.

Driver: SleepWatch has to be able to come off. (Hold button). HPCS should be used in conjunction with PERCLOS. PERCLOS needs more defining. The past 4 weeks were interesting and confirm what I have read in various magazines. Should be applied to all vehicle and other equipment operators.

Driver: It's all good to test for driver fatigue and try and help, but needs a lot more testing and improvements.

Driver: Tough to manage your day activities, to add the tests.

Driver: Sounds emitting need to be different from others in truck – they are all somewhat similar.

Driver: I enjoyed it very much and was not distracted by it at all. Think that it will be helpful to other drivers.

Driver: I was very proud to be in this driver fatigue course, I think all drivers should do this.

Driver: Should do a true study giving 2 weeks short runs and 2 weeks long runs to see the difference. The SafeTRAC would be a truly useful item.

Driver: PVT should be only in 5 mins. instead of 10 mins.

Driver: I liked the watch. Had I drove more in the 4th week I would have been better. I.e. Tuesday I went to Canada's Wonderland, Thursday I was taken out of Truck Unit #1740 and put into Unit #1686; and Friday there was no driving at all.

Driver: I found testing was very helpful in discovering my own personal observations of my degree of alertness and drowsiness. Equipment was somewhat intrusive in the cab of the truck.

Driver: Course and overall experience was excellent – any attempt to help drivers understand fatigue and alertness is good. The hardware was somewhat helpful – but was easily ignored after awhile. 1) PVT was best
2) SafeTRAC was useful 3) PERCLOS & SleepWatch didn't do much for me 4) Power Centre steering was terrible.

Driver: I thought that my dispatchers had deliberately pushed a little more, just to see what my endurance level is.

Driver: Too much electrical interference. Too short of runs, sometimes 2-3 loads in one day. It would have been more effective on longer loads.

Driver: Drew attention from authorities.

Q. 65 Overall, how useful/effective do you believe the idea of having Driver Alertness and Fatigue Management aids in the truck cab is for assisting you in managing your driving alertness and contributing to safe driving? Circle the one that applies and explain.

1	2	3	4	5
Strong dislike/ Needs much improvement	Not satisfactory/ It needs some improvement	Neutral opinion about it	It's helpful/ I like it	Very helpful/ I'd Use it

Summary for Q. #65

Summary data from “With Feedback” condition, (after completing four weeks of driving in the study) 23 drivers’ responses rated an **average score of 3.76**

Driver comments:

Driver: 5 For safety, that’s very good.

Driver: 3 It will not change requirements of shippers and hours of services regulations. It may be useful if the driver wants to follow it.

Driver: 5 After 4 weeks I believe it’s an excellent program for everyone to encounter. It’s wonderful experience.

Driver: 1 I know when I am tired. I know the signs. Yawning, aches, bad shifting. Soreness.

Driver: 3 I think in some places companies would use this against drivers in accidents.

Driver: 5 Confirms personal observations – gives driver a positive reason for resting.

Driver: 3 He said he is from a family of truck drivers, recognizes there are some “bad people” out on the highway who just don’t know when to stop to get rest.

Driver: 4 Most drivers do not know when they are fatigued.

Driver: 2 Not satisfactory. I think my results would be more positive if equipment in the truck or the truck itself was in better working condition. i.e./wheel alignment, SafeTRAC not beeping all night.

Driver: 3 I am a great monitor of fatigue.

Driver: 5 I think it’s a good thing to have. Also I would need more time and training to appreciate the equipment better and better utilization.

Driver: I’d say 3 and ½. I have the opinion that with improvement many of the systems would be helpful.

Q. 66. Do you think other commercial drivers would benefit from fatigue management aids?

_____ yes _____ no

Summary of Q. #66: 23 YES 2 No and 1 YES&NO

Driver Comments:

Driver: yes I think so, I'm sure some accidents are because of drivers being too tired.

Driver: yes They have in their mind safety comes first.

Driver: yes Drivers who cannot tell when they are tired. The ones who for various reasons cannot tell time.

Driver: yes Anything that helps is good.

Driver: yes I think they would serve as a guideline.

Driver: yes Everyone could benefit from fatigue management aids.

Driver: yes Some drivers really don't know when they have had enough.

Driver: yes The more a driver is aware that fatigue is a killer – the better.

Driver: yes But I still feel if shippers and receivers didn't waste so much of one's time we would get more rest.

Driver: yes Older drivers could use some help.

Driver: yes With proper training the systems can be very useful.

Driver: yes and no With improvement to systems.

Driver: no The system of dispatching, planning, and ETA's would need to change; plus you still have the HOS REGS working against you

Driver: no For new drivers yes.

Q. 67. At any time did your fatigue management and alertness monitoring systems shut down while driving during the on-the-road testing?

_____ yes _____ no. If yes, what were the circumstances?

Summary of Q. #67: 9 YES and 17 NO

Driver: yes APP+ (the black box recorders) shut down a couple of times. It would not read my ID Card. Card was not inserted properly.

Driver: yes SleepWatch went dead.

Driver: yes The SafeTRAC needed to be adjusted for more accuracy. Other than that it was good. All the others worked okay.

Driver: yes The plug on the SafeTRAC camera came loose.

Driver: yes Some of the lights would go out.

Driver: no I find while driving at night the lighting could be improved to reduce fatigue. The unit I drove, the headlights were misaligned.

Driver: no I shut Howard HPCS off once just to make a comparison.

Driver: yes When I returned from off duty status.

Driver: no However, SafeTRAC would often say calibration “fail”

Q. 68. Was there enough warning from the alertness monitoring devices’ numeric displays to alert you to the fact you were driving while very drowsy and/or that you might be becoming too sleepy to continue driving safely? _____ yes _____ no

Summary for Q. #68: 10 YES, 12 NO, 1 yes & no; 3 blank

Driver comments:

Driver: yes The only one I really liked to use was the SafeTRAC.

Driver: yes SafeTRAC would beep more frequently when I was getting really tired. SleepWatch was really helpful in judging my alertness.

Driver: yes It worked very well in keeping me in line with how sleepy I was getting.

Driver: yes loud beep

Driver: no I usually felt good when it was saying I was not, so I can’t trust it yet.

Driver: no I did not allow myself to get to that point at anytime to say yes.

Driver: no Devices gave same warning when rested in bad weather.

Driver: no Sporadic readings on PERCLOS.

Driver: no A few times I was very tired and the PERCLOS was reading 96’s and 98’s.

Driver: no Not really – I drove tired, and PERCLOS read 100%. – maybe I sleep with my eyes open. SafeTRAC never went off when I was really tired. I don’t swerve or weave much. However, it went off religiously if I intentionally hit a lane line with no turn signal.

Driver: no The alarms where not activated (not turned on properly.)

Driver: yes and no Need more accurate readouts.

Driver: blank I never do get drowsy. I work city driving.

Driver: blank Due to not working more than ten hours a day, I went to bed on time.

Q. 69. When you received low alertness, or drowsy driving indicators on the digital displays, did they generally seem to accurately match what you were experiencing in terms of drowsiness at the time? _____ Yes _____ No

Summary of Q. #69: 14 YES 9 NO and 3 Blank

Driver comments:

Driver: yes Most of the time.

Driver: yes I will take a break that's for sure and sleep a couple hours.

Driver: yes When the SafeTRAC would beep more often I knew I was tired.

Driver: yes Only the watch.

Driver: yes SleepWatch indicator did not match my feeling of tiredness.

Driver: yes When I felt like stopping, or more like made myself stop _____ for a break, the numbers usually matched.

Driver: no I never received a low alertness warning.

Driver: no Sometimes PERCLOS would read 40-50% Not sure why. Sometimes camera would move or be jarred, and I'd re-position it – numbers would come back up.

Driver: no The rating on the watch was too vague.

Driver: no I did not get that drowsy.

Driver: no Two times, I recall not being tired.

Q. 70. Which system(s) matched your alertness level best? Rank them with a number 1 as best and 4 as the least helpful in matching your alertness level). And then tell us how you think the most effective ones did this?

_____ PERCLOS _____ SafeTRAC _____ SleepWatch _____ PVT Reaction Time

Driver #001: 2 PERCLOS 4 SafeTRAC 3 SleepWatch 3 PVT

- Driver #002:** 4 PERCLOS 1 SafeTRAC 2 SleepWatch 4 PVT
SafeTRAC I think that's the best over the other three
- Driver #003:** 3 PERCLOS 1 SafeTRAC 4 SleepWatch 2 PVT
- Driver #004:** 4 PERCLOS 2 SafeTRAC 1 SleepWatch 3 PVT
- Driver #005:** 4 PERCLOS 1 SafeTRAC 1 SleepWatch 1 PVT
- Driver #006:** 4 PERCLOS 4 SafeTRAC 4 SleepWatch 1 PVT
When awake & rested good score on PVT. When tired bad scoring.
- Driver #007:** 2 PERCLOS 4 SafeTRAC 3 SleepWatch 3 PVT
- Driver #008:** 3 PERCLOS 2 SafeTRAC 1 SleepWatch 4 PVT
- Driver #009:** PVT (was circled) "Indicated a relationship of reaction times to fatigue"
no other markings on the data sheet
- Driver #010:** 2 PERCLOS 2 SafeTRAC 2 SleepWatch 2 PVT
- Driver #011:** 2 PERCLOS 3 SafeTRAC 1 SleepWatch 4 PVT
- Driver #012:** Check-marked SafeTRAC only
- Driver #013:** Marked an "X" for SafeTRAC only
- Driver #014:** Dropped out
- Driver #015:** Marked an "X" for SafeTRAC only
When I was tired I tended to drift.
- Driver #016:** Dropped out
- Driver #017:** n/a PERCLOS 1 SafeTRAC 1 SleepWatch 4 PVT Reaction Time
- Driver #018:** 4 PERCLOS 3 SafeTRAC 2 SleepWatch 2 PVT Reaction Time
- Driver #019:** marked an "X" for SleepWatch only
- Driver #020:** 4 PERCLOS 2 SafeTRAC 3 SleepWatch 1 PVT Reaction Time
- Driver #021:** 3 PERCLOS 2 SafeTRAC 4 SleepWatch 1 PVT Reaction Time
When I was tired, my reaction time slowed down.
- Driver #022:** n/a PERCLOS n/a SafeTRAC 4 SleepWatch 1 PVT Reaction Time

Driver #023: blank for ratings
He simply wrote "SleepWatch"

Driver #024: 2 PERCLOS 1 SafeTRAC 1 SleepWatch 1 PVT Reaction Time

Driver #025: Marked an "X" for PVT Reaction Time
Wrote: it was closest

Driver #026: 3 PERCLOS 2 SafeTRAC 4 SleepWatch 1 PVT Reaction Time

When tired it was hard to concentrate and numbers were a lot higher.

Driver #027: 4 PERCLOS 1 SafeTRAC 3 SleepWatch 2 PVT Reaction Time
Gentle light, easy to see and mental reminder.

Driver #028: 2 PERCLOS 1 SafeTRAC 4 SleepWatch 1 PVT Reaction Time

Q. 71. Which system(s) matched your drowsiness level best? Rank them with a number 1 as best and 4 as the least helpful in matching your drowsiness level). And then tell us how you think the most effective ones did this?

____ PERCLOS ____ SafeTRAC _____ SleepWatch _____ PVT Reaction Time

Explain:

Driver #001: driver marked a "4" for SafeTRAC only

Driver #002: driver marked a "1" for SafeTRAC only
Because when beep, beep means some time you are tired

Driver #003: 3 PERCLOS 1 SafeTRAC 4 SleepWatch 2 PVT

Driver #004: 4 PERCLOS 2 SafeTRAC 1 SleepWatch 3 PVT

Driver #005: 1 PERCLOS 2 SafeTRAC 4 SleepWatch 4 PVT
They were more accurate in what was drowsiness.

Driver #006: 4 PERCLOS 4 SafeTRAC 4 SleepWatch 1 PVT
(See above Q. 70)

Driver #007: 2 PERCLOS 4 SafeTRAC 3 SleepWatch 3 PVT

Driver #008: 3 PERCLOS 1 SafeTRAC 2 SleepWatch 4 PVT

Driver #009: PVT was circled with explanation: "same as above"

(Driver's explanation to Q. 70 was "Indicated a relationship of reaction times to fatigue)

- Driver #010:** 2 PERCLOS 2 SafeTRAC 1 SleepWatch 1 PVT
Sleepwatch & reaction time.
- Driver #011:** 2 PERCLOS 3 SafeTRAC 1 SleepWatch 4 PVT
- Driver #012:** checkmark at PVT
- Driver #013:** driver marked "X" for SafeTRAC only
- Driver #014:** Reassigned new number
- Driver #015:** driver marked "X" for SafeTRAC only
- Driver #016:** Withdrew from study
- Driver #017:** n/a PERCLOS 1 SafeTRAC 1 SleepWatch 4 PVT Reaction Time
- Driver #018:** 4 PERCLOS 3 SafeTRAC 2 SleepWatch 2 PVT Reaction Time
- Driver #019:** Marked an "X" for SleepWatch only
- Driver #020:** 4 PERCLOS 1 SafeTRAC 3 SleepWatch 2 PVT Reaction Time
- Driver #021:** 3 PERCLOS 2 SafeTRAC 4 SleepWatch 1 PVT Reaction Time
- Driver #022:** marked only 1 SleepWatch 4 PVT Reaction Time
- Driver #023:** he only wrote: SleepWatch
- Driver #024:** 2 PERCLOS 1 SafeTRAC 1 SleepWatch 1 PVT Reaction Time
- Driver #025:** Marked an "X" for PVT Reaction Time only
When tired was unattentive.
- Driver #026:** Marked an "X" for SafeTRAC only
When the numbers were low I realized how poor I was driving
- Driver #027:** blank
- Driver #028:** 3 PERCLOS 2 SafeTRAC 4 SleepWatch 1 PVT Reaction Time

Q. 72. During the on-the-road testing, was there anything in the fatigue management instrumentation that distracted you from performing your driving duties or interrupted your concentration on your driving tasks? _____ yes _____ no

Summary for Q. 72: 11 YES and 15 NO

Driver Comments:

3 Drivers: yes The PERCLOS – Flashing; Red flashing light. Pulsing PERCLOS.

5 Drivers: yes SafeTRAC beeping when moving, and parked, it's too sensitive. SafeTRAC, it just got on my nerves all the time. SafeTRAC, too many beeps –similar to computer and signal indicator. Beep distracted my attention. SafeTRAC as I say, I watched mirror.

1 Driver: yes I found I really didn't have time for the PVT test.

1 Driver: yes At night – lights from displays reflected off windshield.

Q. 73. Did you notice anything unsafe about the fatigue management equipment and systems installed in the cab of your truck?

_____ yes _____ no. If yes, please describe what you considered was unsafe.

Summary of Q. 73: 7 YES and 19 No

Driver: yes HPCS controls need to be moved off the side of the seat on Freightliner trucks.

Driver: yes SafeTRAC would not keep truck straight. It would also beep at night at idle.

Driver: yes SafeTRAC blocked most of my side mirror -- “mirror on load.”

Driver: yes It would be hard to see the fender mirror if you are short.

Driver: yes The position of the controller for Howard HPCS, it needs to be up front to be see and adjusted easily.

Driver: yes FMT equipment blocked my view of the dolly mirror mounted on front right bumper.

Driver: yes I did not watch my mirror enough, trying not to set off the beep on the SafeTRAC.

Q. 74. In design and use of fatigue management systems what needs to be changed? How? Why?

Driver: When they installed they put too many wires over defrost vents kept them from working well in snow.

Driver: The steering sensors need to be put more securely on the trucks.

Driver: Felt considerable strain on forearms, and wrists.

Driver: SleepWatch has to be less noticeable SafeTRAC move intel. with surroundings.

Driver: Make the tested equipment less obtrusive.

Driver: I would leave things the way they are. Had no problems with where they were mounted or located.

Driver: PVT test should be shorter. PVT should only be 5 minutes at a time.

Driver: I think the fatigue course is a great idea to have, like to see it in every vehicle. In future, helps driving to acknowledge his faults.

Driver: The FMT equipment idea is good but only if a carrier, company will have a good cooperative maintenance shop that can do the care and feeding of equipment.

Driver: I thought the devices were very helpful in driving skills. Kept you alert at all times when you were drifting across road. Thought that the SafeTRAC was too sensitive at times. It would keep even when you were driving straight down the road. I barely would turn wheel and it would go off. It did this off and on during the 4 weeks for the study.

Driver: Said SafeTRAC distracted and beeped at inappropriate times often it would say it was calibrating it would then say “Calibration failed”

Driver: The SafeTRAC was not set up proper adjusted numbers.

Driver: SafeTRAC, I would sometimes be a foot and a half away from center line and it would still go off, or it would go off for no reason at all.

Driver: SafeTRAC needs to be more accurate on lane markings – at times it gave false readings and beeps.

Driver: Put in a hand held button. SafeTRAC – is too sensitive beeps before crossing lines.

Driver: SafeTRAC needs to be in a position where you don’t need to stretch to adjust it.

Driver: Turn SafeTRAC volume down.

Driver: The SafeTRAC beeped at him each time he crossed the painted lines. (During the “no feedback” conditions.)

Driver: PERCLOS should be set on a pivotal mount

Driver: PERCLOS needs to be set up so you can adjust for different heights.

Driver: PERCLOS would only read 100% when unit was turned away or blocked. Unit also moves too much with vibration of truck.

Driver: Would like to see a better situation for use of PERCLOS during day time driving – if driving all night should have recording possibilities for daytime drowsiness.

Driver: It is good to have a PERCLOS in the truck. The numbers drop down quick and its good. But mostly I didn't pay much attention to it.

Driver: I was confused over the meaning of the PERCLOS numbers; and when it read 100, it was meaningless. When it went to 28 I was tired. It changed too much; presented too many numbers, confusing numbers. It's too hard to figure it out.

Driver: He wished PERCLOS "beeped" when a driver's eyes were off too long. If don't have SafeTRAC – then want PERCLOS to beep a single beep, not more.

Driver: PERCLOS shows eye droop if you look away, which in heavy traffic of a.m. rush hour you have to do.

Driver: Sometimes when you drive tired you drive "staring" out the front window, which would give false readings on the PERCLOS.

Driver: Any devices must be integrated into the truck dashboard so the driver can establish a regular scan pattern.

Driver: Better positioning of hardware – perhaps some integration. A central display is needed.

Driver: The truck air conditioner needs to be working.

Driver: More built in systems, these take up too much room on the dash.

Driver: Relocate the HPCS controls.

Driver: Steering box gave off heat inside cab. Found I used A/C when I would normally not.

Driver: Positioning of all equipment. HPCS I still think is a good system, but control needs to be mounted where driver can see and use better, i.e. Dash mount.

Driver: If this equipment is to be used in production, all such equipment should be in dash if possible or made smaller.

Driver: A woman driver was 5'4" in height, asked that we fix some human engineering aspects of reach for controls and display of FMT information.

Driver: Liked the watch, it should have date and pulse monitor. An alarm would be useful as well.

Driver: I think it would have been more useful if it was done in weather that was more consistent. (Summer Months when weather is better.)

Driver: He liked the FMT devices. Fix 'em up & integrate some or all. Things I think to change would be put everything into one device, or a smaller box so it doesn't use so much room. He's very glad he did participate in the study.

Q. 75. What changes, if any, would you make to the testing procedures we employed with you during this project?

Driver: Run the study over a longer time span.

Driver: PVT test before going to bed only.

Driver: It would be better to do the study in more consistent weather (Summer months) as in our first couple of weeks we had some bad snow and heavy rain that affected the results.

Driver: I would leave things the way they are.

Driver: Use longer drives.

Driver: Infrared camera should be removed.

Driver: Should make drivers do actual runs with mountains, traffic, and typical driving conditions.

Driver: Make dispatchers more aware of what is expected on drivers while they participate in this study.

Driver: The Air Conditioner wouldn't work

Driver: Give parameters on equipment so we can see if they correlate.

Driver: Give an additional training update after a short period, say 2 weeks after using the equipment and getting familiarized with it.

Driver: I would give Questionnaire to be done during course of testing as opposed to after the two and four weeks are up. – Opinions Change.

Q. 23. (No Feedback) and Q. 76 (after With Feedback). What are your opinions regarding ideas of placing driver drowsiness or fatigue monitoring systems into commercial trucks?

23. What are your opinions regarding ideas of placing driver alertness indicators, or drowsiness/fatigue detection systems into commercial trucks?

Answers to Q. 23:

Driver: Good idea. It depends upon the proponents.

Driver: My opinion. I stay more alert, awake now when drowsiness / fatigue occurs. I take a break

Driver: Good idea for lane tracker and steering system.

Driver: It would be a great idea if can happen with maybe reduce accidents due to a fact of alertness or fatigue.

Driver: Do it within shortest time period possible.

Driver: I think it's a very good idea.

Driver: For legal drivers it'd be very beneficial and could support drivers' decisions to rest when pressurized by dispatch.

Driver: I would like it very much. It would let you know what is going on around you and also improve your driving.

Driver: I think it could work if drivers use it right.

Driver: I think it would be very good.

Driver: I would like to see this done.

Driver: I think the SafeTRAC should be in every truck.

Driver: I believe that the SafeTRAC would be too intrusive to some and they would turn the beep off; the PERCLOS could become hypnotic and create loss of concentration. If these minor problems could be overcome I believe we would have safer drivers by using such equipment. Also need to tie equipment in to truck system so that the pulse from the PERCLOS does not come across the radio. AM Radio reception was terrible with interference from monitors.

Driver: In principle a GOOD thing. Obviously need more ergonomic placement of machinery (rather than on dash).

Driver 22: I think it would be good but I think they would use it as a last resort for running further.

Driver: I think it would be a very good idea.

Driver: Unless they can shut truck down, it is not going to stop your "around-the-clock driver."

Driver: I like the idea. But I'm a little nervous that it may take control. Like when driving at night I'm not as alert as in the day time and it may not let me go.

Driver: Would only be temporarily be effective for most drivers; would probably ignore in the name of \$\$'s.

Driver: Incorporate into design of truck and they would be a big asset!

Answers to Q. 76 (after the “With Feedback” condition (at end of 4 weeks)).

Driver Comments:

Driver: I think it would not bother me. But generally it would bother the industry as being intrusive.

Driver: It doesn't bother me.

Driver: I like the idea. But will it really catch on?

Driver: It will be used by those who want to and ignored by those who don't.

Driver: I'm all for it because it could cut down on accidents due to fatigue or drowsiness if believe it works.

Driver: Simply, if it annoys the driver they will neutralize it.

Driver: A good idea with some improvements.

Driver: They could be used against a driver to rate him. It's like personality profiling.

Driver: I like the idea. It would help drivers in their driving skills.

Driver: I think they should be put in all trucks.

Driver: Good idea.

Driver: It would take away, but SafeTRAC would be very helpful.

Driver: It would be helpful.

Driver: Would be an excellent idea if only you could guarantee that “All” drivers would adhere to results and findings and not shut equipment down to avoid detection. Drivers are too much in denial of drowsiness and lack of alertness – “MUST GET LOAD THERE!!” Drivers have poor social lives in general and tend to take time to enjoy activities that usually affect sleep time. Drivers would, I think, rebel.

Driver: Although I might not like it – I'm sure that any devices that make drivers aware of their level of drowsiness or lack of attention is a good thing.

Driver: Some drivers may use this as a “last minute” crutch; that isn't what I think these are for.

Driver: Have A Power nap

Driver: Good Idea

Driver: If tested properly and showed a “real life” figures.

Driver: Very good idea. But most importantly is the understanding of what it is telling the driver. Training updates and interaction with instructors for fine tuning the equipment to the individual.

Driver: Would prefer overhead displays.

Driver: Only if not used as a tool by company to rate drivers’ abilities.

Q. 77. This question is about driver opinions regarding your alertness being monitored or your performance being recorded.

In this study, for our research purposes, we obviously collected measurements of a) your *alertness* and/or *drowsiness*, the *amounts of sleep* you obtained or missed, and your driving performance data within the truck. As we promised, we will only describe those data in our reports with full respect of driver confidentiality, e.g. we will cite them in group statistics, etc.

You knew from the beginning of your participation, that we installed an Accident Prevention Plus (AP+) black box recording system in the truck, and it continuously recorded many parameters about the truck performance, your driving performance, and the alertness or drowsiness indicators from the fatigue management devices as well. **Note** this question was also asked as **Q. 24** after the first two weeks of driving with “No Feedback” condition.

The *prototype* driver alertness monitoring systems we provided you in this study (e.g. the SleepWatch, Lane Tracker, PERCLOS) are each meant to be the driver’s personal alertness monitoring systems, for his or her personal use only. At this point, they are not designed nor intended for capturing your performance data for use by any other person(s).

Since you knew that, the question is, did the idea of having your performance recorded for several weeks have any effects on your driving behavior, and performance?

_____ Yes, some effect _____ No effect _____ I’m not sure Please explain:

Summary for Q. #24: 24 NO Effect, 1 not sure, and 1 blank

Driver Comments:

Driver: No effect. Out of sight – out of mind.

Driver: I’m not sure At first I knew it was there, but you soon try to forget it and carry on as usual.

Driver: No effect . I believed my driving is satisfactory before entering “study.”

Driver: No effect. I think I forgot it was there most times.

Driver: No effect. It made me more aware of some driving habits that have developed.

Driver: No effect. I try to drive safe all the time.

Driver: No effect. I tried to disregard the monitors for more natural results.

Driver: No effect. I agree with monitoring systems. I used to use tachographs – very comfortable.

Driver: No effect. None because I forgot that he mentioned that part.

Driver: blank Self- Conscious. Intimidated by monitoring.

Driver: No effect. I feel I am a good driver.

Summary for Q. #77: 6 YES some effect 8 NO Effect, 1 not sure, 11 blank

Driver comments:

Driver: yes When I missed a gear or maybe was going down hill a little quicker than I should have, I was thinking about recording system

Driver: yes, some effect. Trying to do to well and I did worse.

Driver: yes, some effect. More aware of driving habits

Driver: yes some effect. It did a little bit. Because at peak driving habits, driving beyond a safe level of alertness.

Driver: yes, some effect I felt self-conscious, worried constantly if I was following all rules and doing things correctly – also concerned about others judging me.

Driver: yes, some effect I didn't watch mirrors as much trying not to have SafeTRAC go off.

Driver: no effect As an old guy (51) I was adamant that I would do nothing different. After getting used to the gear – I just went and did my thing – Alert – drowsy, downright tired – Let the data speak.

Driver: no effect I drove the same way as I felt. I was already driving safely and wanted to measure my own performance as it is, rather than changing my habits.

Driver: no effect. I just drove way I always do.

Driver: no effect I tried to ignore the situation in order to achieve a true environment for the study – did not attempt to drive to satisfy the required or perceived results.

Driver: no effect This is the way I drive. If I'm good enough to work here for many years, then this box will not change things.

Driver: no effect I did not let it affect my performance of truck driving.

Driver: no effect Mistakes are made at normal times by ignoring the equipment. And driving normally there is no pressure on the driver. A person under certain pressure may make errors.

Driver: no effect Just carried on as usual.

Driver: I'm not sure. I feel I drove the way I always do.

Q. 25 (No Feedback Condition) and also Q. 78 (With Feedback Condition).

If use of fatigue management aids (like PERCLOS, SafeTRAC, or SleepWatch) or black box monitoring technologies (like our AP+ recorder) were made mandatory, by either government regulations or by trucking industry management, what is your opinion about how they should be used, or might work best? What operational or procedural considerations would they present to you as driver?

Q. 25, after "No Feedback" Condition, (end of 1st 2 weeks).

Driver comments:

Driver: I can't tell you well see in more 2 weeks

Driver: Could be used for lane tracking but other than that would only be useful after an accident.

Driver: SleepWatch: No. Drivers would prefer their own watch. SafeTRAC needs more refinement when reading road lines. PERCLOS you will have problems with (unions etc.).

Driver: If they monitor drivers, companies should be held responsible for pushing the drivers pass the legal limit and telling them to falsify the logs.

Driver: PVT takes time in a busy schedule that may not be available on shorter trip. Could be another intrusive way of monitoring hours of driving.

Driver: As long as it would not come back against us for accidents or minor incidents, I would think that it would be a great idea.

Driver: I think all about study would be very smart thing to have in these trucks.

Driver: Might take more rest breaks, make the trucking industry as a whole understand fatigue.

Driver 15: I think the SafeTRAC should be mandatory. The black box could be omitted.

Driver: It would be good for of you were involved in a accident or traffic violation, so you could check it out.

Driver: The APP+ and the SafeTRAC would be tied in together to show driving patterns pre-accident situations. The SleepWatch would be a more constant reminder of sleep required.

Driver: Disagree. Government regulations would negate any good in what should be a company policy, or personal decision (and purchased by % for their own good).

Driver: I think fatigue management should be also given to dispatchers for understanding their drivers when they say they're tired.

Driver: I am all for safe driving.

Driver: As far as fatigue aids it would be good. As far as a black box, I think most guys would look for new jobs.

Driver: Don't have an opinion. In all conditkions I run safe and legal.

Driver: I don't know how to answer. I guess it's a good idea, but nobody needs to know your every move, that's too much.

Driver: I'm not for this idea – Feel basic human instinct (provided instincts are not ignored) goes much further.

Driver: Big Brother !! They can help me but I don't want me driving monitored by others.

Driver: It would help drivers to get off the road sooner and before they have an accident.

Driver: But only if drivers adhere to safety standards in general. It is still difficult to teach drivers to self – analyze their state of fatigue and alertness and take heed or pay attention.

Driver: Raising awareness of one's mental and physical state before, during and after is a GOOD THING.

Q. 78 After “With Feedback” Condition, (end of 4 weeks),

Driver Comments:

Driver: Swipe type card system. To sign on and off would be a better way. But overall System would not be bothersome.

Driver: They should be used if you have a wreck and it goes to court.

Driver: Might make some drivers more aware of what they are doing. Since it may hang them and the carrier if there is an accident.

Driver: A very good idea. I'm for it with no problems.

Driver: I'd quit because the equipment still needs (electronics) better refinement. Laws need to be rewritten to protect both sides.

Driver: Not sure. Maybe only in the event of an accident. Same as aeroplanes as the black box.

Driver: It would keep bad drivers off the road.

Driver: Drivers first should have feedback before the information is being allowed to be seen by others.

Driver: I think that they are a good idea. As long as the government or trucking industry does not come back on us, I believe that it is a good system and might help get drivers to do a better job with their skills; and also let them know when it is time to take a break.

Driver: I think this way it is step up. It is good.

Driver: The APP+ recorder would be the best.

Driver: I dislike the SafeTRAC. It does not help much. It's more of a pain. PERCLOS does not work at all. So yes, I think it's a bad idea.

Driver: I like that idea. Would help in case of accidents.

Driver: Everything would have to be built into the truck console. Driver would have to be unable to manipulate equipment.

Driver: As a voluntary system – great. As a regulated system – a nightmare. It would be sabotaged by the very people it's meant to help. Look at log books. See also "hours of service."

Driver: I think they should be used to "post hoc" accident investigations.

Driver: I'd look for new line of work.

Driver: Unsure.

Driver: Hopefully in a positive way to help drivers with bad habits, to recognize them and correct them. And set parameters for the individuals for alertness.

Driver: It takes more time preparing and shutting down for day - \$\$'s.

Driver: As long as the company did not use against driver, I could see a practical use.

Q. 79. Did you have any law enforcement citations for moving violations during the last 2-week period while driving your truck? _____ yes _____ no If yes, please explain:

Summary for Q. #79: 4 Yes and 22 NO

Driver #002: yes

Driver #005: yes Disobeying signs

Driver #013: yes Driving in a restricted truck lane

Driver #027: yes Over axle – load secure device broke in movement. Load shut overweight on drive.

Q. 80. Did you have any law enforcement citations for logbook violations during the last 2-week period while driving your truck? _____ yes _____ no If yes, please explain:

Summary for Q. #80: 26 No

Q. 81. Where you involved in an accident or crash during the past 2-week period while driving your truck? _____ yes _____ no. If yes, please explain.

Summary for Q. #81: 2 Yes and 25 No

Driver #006: yes In company yard, forgot to set brake. Tractor rolled forward hit small truck, broke light on tractor. In broad daylight; a stupid error.

Driver #022: yes, during the “no feedback” 2-weeks period. I took out the fence post in the Montreal due to new equipment, and lack of sleep.

Q. 82. Did you have any law enforcement citations for an action that occurred in the context of an accident during the last 2-week period while driving your truck? _____ yes _____ no If yes, please explain:

Summary for Q. #82: 26 NO and 0 YES

Q. 83. Are you willing to participate in a focus group session with other drivers, which would be held when all drivers have completed their participation in this study? The session is intended to increase our understanding of driver experience and reaction to the FMT devices. Any publication of the results of the focus group session will not identify individual drivers.

Summary for Q. #83: 24 YES and 2 NO

Q. 84. Please think ahead with me for a few moments beyond the results of this field study. Assume for this question that we would be able to have some engineers and equipment designers make many of the important improvements and changes to the “fatigue monitoring devices” you have worked with these past four weeks ---- lets assume that we put many of the good suggestions you and your fellow drivers gave us into practice; that we had the devices all fixed up right, so that they worked well and were mounted properly into the cabs of the trucks. The question for you now is, how would you rank the items on a scale from “one” to “ten” in terms of how well you would like them for yourself and other truck drivers? Use the rank of “1” to mean “not good, don’t like or want it” and use the rank of “10” to mean it’s a terrific idea, and you would like to have one in your truck and/or think other drivers should want it too.

Please rate each device on a scale of from “1” to “10”:

SleepWatch: _____	PERCLOS: _____
SafeTRAC: _____	HPCS: _____

Answers to Question #84 shown as raw data in table. For the 4 empty cells (N/A) drivers declined to rate FMT devices they deemed to not be working. Thus if we do any statistics on these data we need to cope with those 4 missing cells.

Q. 84 Table: Raw Data Rating Scores for each FMT Device (1 to 10 scale)*

Canada Driver Number	Fatigue Management Technologies			
	CoPilot PERCLOS	SleepWatch	SafeTRAC	Howard Power Center Steering
001	5	6	9	9
002	8	6	8	10
003	3	3	7	10
004	6	3.5	7	10
005	N/A	N/A	9	10
006	5	3	2	3
007	7	7	1	7.5
008	6	10	5	7.5
009	3.5	4	5	8
010	8	8	10	10
011	7	8.5	5	9
012	N/A	8	10	10
013	5	7.5	10	8
014	Reassigned	Reassigned	Reassigned	Reassigned
015	5	7	10	6
016	Dropped out	Dropped out	Dropped out	Dropped out
017	5	5	8	10
018	8	10	10	5
019	7	10	5	8
020	8	9	9.5	9.5
021	4.5	4	7	1
022	3.5	5	8	6
023	10	7.5	8.5	N/A
024	8	8	10	7
025	8.5	7	9	6
026	5	6	10	8
027	1	5.5	7	4
028	2	2	7.5	7.5
N=26	N=24	N=25	N=26	N=25
Average Rating	5.79	6.42	7.60	7.60
Percent≥5.5	50%	68%	77%	84%

*Use the rank of “1” to mean “not good, don’t like or want it” and use the rank of “10” to mean “it’s a terrific idea” and you would like to have one in your truck and/or think other drivers should want it too.

Driver: The busier it gets in traffic the slower I go. You gotta make a continuous effort to “control your space” on the road and it only takes one jerk to screw it up. – (meaning the flow of traffic.)

Driver: I like this SafeTRAC. Put in all trucks, its very good in crosswinds.

Driver: He’s glad he did the study. He says this study brought all the “fatigue stuff” back to the surface. He says he personally knows when to shut down, stop the truck and rest.

Driver: He calls himself a causal, relaxed driver; he practices driver management on his own; takes regular breaks; does not exceed 10 hrs of driving. He said when he gets tired he grinds truck’s gears. He gets sleep inertia in early morning.
