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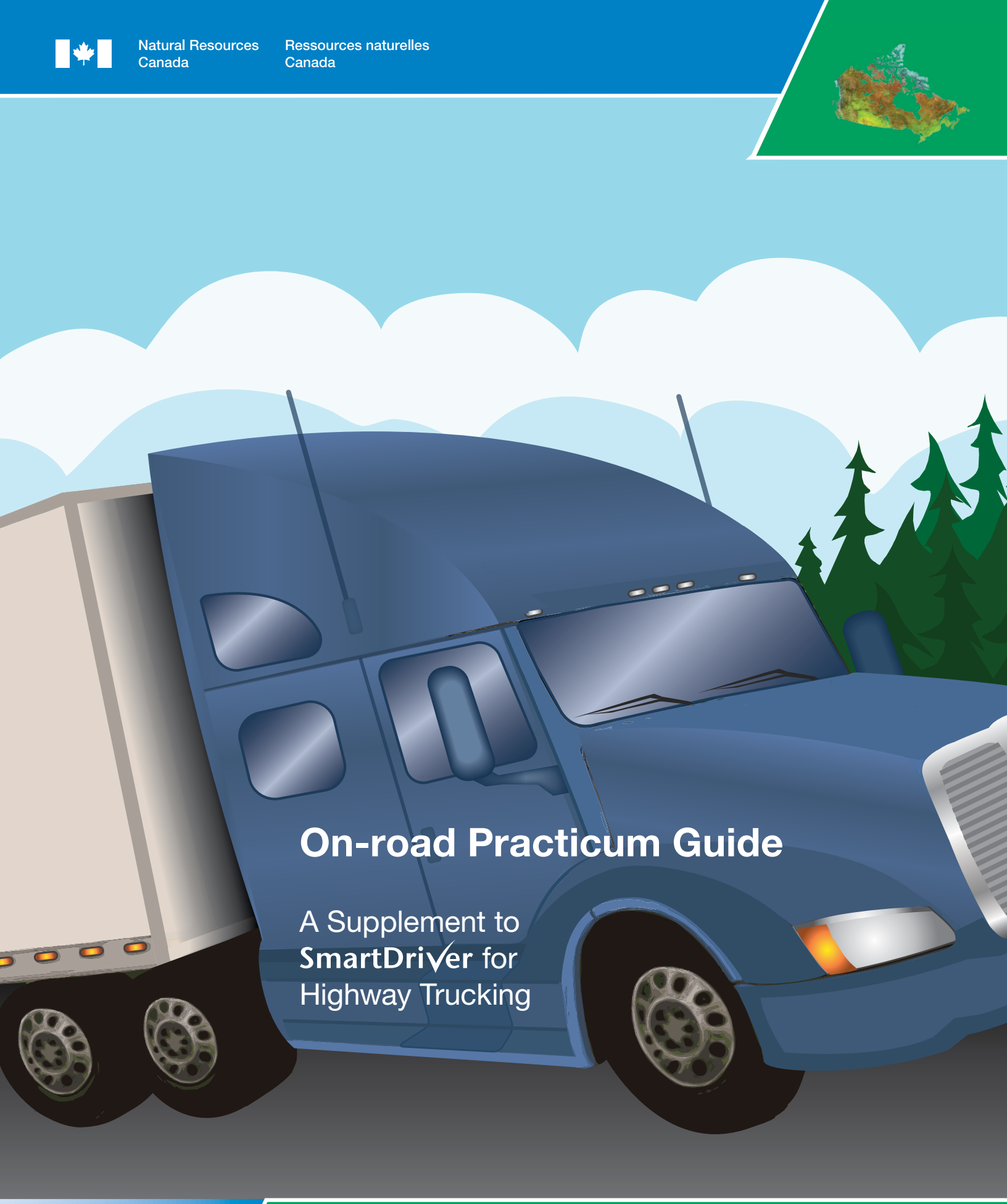

On-road Practicum Guide

A Supplement to SmartDriver for Highway Trucking

Canada

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The purpose of the on-road practicum is to enhance the *SmartDriver for Highway Trucking* (SDHT) course so that professional drivers understand more clearly the benefits of using "SmartDriving" techniques to reduce fuel consumption and greenhouse gas (GHG) emissions.

GHGs, particularly carbon dioxide (CO_2), are produced when fuel is burned in the engine. For every litre of diesel fuel used, approximately 2.7 kilograms (kg) of CO_2 are generated. CO_2 is a colourless, odourless gas that is a normal part of Earth's atmosphere. However, when the amount of CO_2 in the atmosphere increases, more heat is trapped. This enhanced greenhouse effect causes Earth's surface temperature to rise, which in turn alters the world's climate.

By measuring each driver's performance before and after the SDHT course, the on-road practicum provides immediate measurable results to illustrate the effectiveness of the newly presented SmartDriving techniques. The pre-training drive provides a record of each driver's fuel consumption and driving habits. The instructor rides along and makes notes during this drive, but does not coach the driver. The post-training drive provides an opportunity for the instructor to coach the driver on using the techniques presented in the classroom and measure changes in fuel consumption.

The addition of an on-road practicum to the SDHT course allows the instructor to

- identify habits and routines that prevent professional drivers from maximizing their fuel efficiency
- clear up misunderstandings from the classroom presentation and provide one-on-one coaching to ensure expert habits are developed
- demonstrate savings in fuel consumption and resulting reductions in CO_2 emissions
- debunk trucker myths and legends
- encourage the smooth operation of all equipment and relate this behaviour to increased vehicle life expectancy and reduced maintenance costs

1.1 Instructor requirements

The instructor for the on-road practicum should be an experienced professional driving instructor. The instructor (or company trainer) should have recognized credentials for the province or territory in which he/she operates, as well as an appropriate level of related experience to be credible with the trainees. For example, if you are a trainer and are instructing professional drivers who operate in the mountains with super trains, you should have comparable experience. Classroom experience is required to deliver the SDHT course as well as the in-cab skills assessment.

The pre-training drive will provide data about each driver's fuel consumption and allow the instructor to observe driving habits. The pre-training drive may be conducted in a vehicle or by using a driving simulator.

2.1 Pre-training drive in a vehicle

Before starting the pre-training drive, the instructor must

- plan the test route
- schedule the use of an appropriate vehicle
- arrange for appropriate data-gathering technology
- obtain Driver Evaluation Forms, a clipboard, pens and a calculator
- ensure that the pre-trip inspection of the tractor and trailer and appropriate documentation have been completed

Planning the test route

Base the route on the normal driving conditions of the trainees. For drivers who normally do city driving with frequent deliveries, the test route should be planned through an urban area. For highway drivers, the route should be mostly on the highway, but also include some city driving because these drivers do exit the highway and go into cities. If the class includes drivers from both categories, consider planning two routes.

City route

Specifications

- Start and end at the training site.
- Make the route about 30 minutes (min.) long.
- The distance will depend on the time expected waiting at intersections and the availability of a place to turn around.

Makeup

- 75 percent collector roads, truck routes and industrial roads with moderate to heavy traffic volumes and maximum speeds of up to 60 km/h
- 25 percent highway with maximum speeds ranging from 80 to 100 km/h

Road conditions

- Include both incline and decline hill conditions.

Highway route

Specifications

- Start and end at the training site.
- Make the route about 30 min. long.
- The distance will depend on the distance to a highway and the availability of a place to turn around.

Makeup

- 75 percent highway with maximum speeds ranging from 80 to 100 km/h
- 25 percent collector roads and industrial roads with moderate to heavy traffic volumes and maximum speeds of up to 60 km/h

Road conditions

- Include both incline and decline hill conditions.

Scheduling an appropriate vehicle

For the pre-training drive, use a tractor and trailer from the fleet usually used by the trainees, if possible. Use a loaded trailer to give results similar to those that the trainees will achieve in their day-to-day work.

You can save time if the same vehicle is used for all the trainees and the drives all happen on the same day, so that only one pre-trip inspection is required. Arrange for the use of the chosen vehicle for 45 min. per trainee. This allows time to do paperwork, including completing the log book, checking licences and completing the Driver Evaluation Form, in addition to the time spent driving.

If trainees use their own, dedicated vehicles for the pre-training drive, the instructor should make arrangements with these drivers to complete their pre-training drives ahead of the scheduled classroom session.

Arranging for data-gathering technology

It is critical to have technology that will accurately record and download fuel consumption results for the pre- and post-training drives. Several methods exist. Test the method you choose ahead of time to ensure that accurate results are collected.

Tractors manufactured since the mid-1990s have electronic control modules (ECMs) that collect performance data from the engine.

Read-outs of the ECM data can be obtained from

- an electronic on-board recorder (EOBR)
- an in-dash data logger
- a plug-in data reader

EOBRs are common in many fleets today, and depending on the brand, version of software and ability to identify individual drivers, using them may be the easiest way to obtain reliable data. These systems may use a satellite download feature or communicate through cell phone service, an in-yard transponder or a card download system.

Usually, the system needs to have the "Log Book" function operating to identify the individual drivers. As well, you will need to find out if the system will generate a separate report for a leg of a trip. Many systems will provide data only for the entire day and will not allow you to gather data for a specific period of driving, even if the driver has logged in and out of the system.

Electronic on-board recorder

INSTRUCTOR TIP:

Use an EOBR only if the driver log book function works and data can be downloaded separately for each driver's pre-training trip.

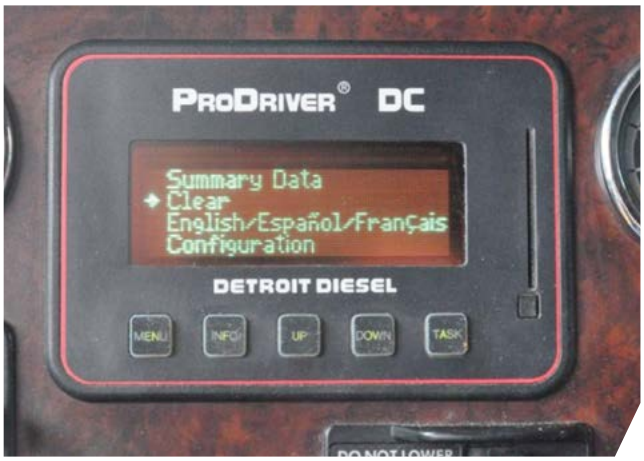
Factory-installed data loggers that communicate with the tractor's ECM have been available since the early 1990s. Different engine manufacturers and original equipment manufacturers (OEMs) have different names for these devices. Regardless of the name, these devices provide instant feedback to the driver about many parameters, including fuel consumption, idle time, maintenance reminders and engine codes.

Most of these devices have a feature that will allow you to zero out the trip or leg recorder in order to start at zero for each test drive. Using a data logger requires discipline on the part of the instructor to ensure it is zeroed at the same time for each participant on both the pre- and post-training drives. As well, the instructor must record the results from the data logger accurately at the same finish point for all drivers.

If the tractor you are using for the pre-training drive is not equipped with an EOBR or a data logger, you will need to obtain a plug-in data reader or a laptop computer that has the OEM software to read the ECM. You may be able to borrow an appropriate data collection device from the carrier's service personnel, who will probably be able to provide training on the use of the device.

INSTRUCTOR TIP:

When using an in-dash data logger, remember to zero the trip recorder at the start of each pre-training drive and to record the driver's results on a form at the end of the drive.



Data logger

Handheld data readers can be purchased from a variety of suppliers that can be sourced online or through your engine or truck's OEM.

Handheld data reader

Plug-in for a data reader in a tractor

INSTRUCTOR TIP:

If this is your first time using a data reader, ensure that it is operating correctly by driving a short test trip and checking that it is recording the data you require.

Driver Evaluation Form

Before beginning the pre-training drive, the instructor must obtain enough copies of the Driver Evaluation Form (see next page) for the expected number of trainees. The instructor will also need a clipboard, pens and a calculator.

SmartDriver for Highway Trucking

Driver Evaluation Form

Driver:	Instructor:	
Pre-training drive – Date:	Start time:	End time:
Post-training drive – Date:	Start time:	End time:
Tractor:	Trailer:	Load weight:
Route or simulator scenario:		

Driving conditions

The instructor must complete the table below after the pre-training drive and note any post-training drive differences.

Visual conditions (circle one)	Clear/sunny	Partly cloudy	Overcast	Foggy	Twilight	Dark
Precipitation (circle one)	None	Showers	Light rain	Rain	Heavy rain	Snow
Temperature (circle applicable)	Below 0°C	1°C to 20°C	21°C and above	Used A/C		
Wind (if on highway) (circle and enter speed)	Headwind	Tailwind	Crosswind	Approximate wind speed (km/h) _____		
Traffic congestion (circle one)	Light	Medium	Heavy			

Make a note here if on-road driving conditions encountered during the post-training drive are different from those encountered on the pre-training drive.

Driver's results

	Units (circle one)	**Pre-training drive**	**Post-training drive**	**Change** (if applicable) (%)
Need to know				
Amount of fuel used	L gal.			
Trip distance	km miles			
Fuel efficiency	L/100 km mpg			
Additional information				
Trip length	hours min.			
Average speed	km/h mph			
Maximum speed	km/h mph			
Average braking distance	metres ft.			
Engine brake activations	number			
Idle time	min. % time			
Fuel used while driving	L gal.			
Fuel used while idling	L gal.			
CO_2 emissions	kg	Fuel used in L × 2.7 =	Fuel used in L × 2.7 =	

Instructor signature

Driver signature

Conducting the pre-training drive

The instructor and the first trainee must ensure that the pre-trip inspection has been completed and documented. Do not repeat the pre-trip inspection for subsequent drives on the same day.

Once inside the tractor, the instructor must

- inspect the trainee's driver licence to ensure that it is valid
- have the trainee complete his/her log book or log on to the electronic data-gathering device, as appropriate
- complete the top of page 1 of the Driver Evaluation Form
- ensure that the trip recorder on the data-gathering device is set to zero
- direct the trainee to drive the planned route
- make notes on the trainee's performance on topics such as idling, momentum management, progressive shifting and speed management
- provide driving directions but avoid coaching the trainee on technique
- make small talk to keep the trainee relaxed
- ensure that the trainee logs out of the data-gathering device as soon as the drive is completed
- record the driving conditions on the first page and data from the data-gathering device in the pre-training drive column on the back page of the Driver Evaluation Form

After all of the trainees have completed their pre-training drives, the instructor may decide to use data from the Driver Evaluation Forms to prepare for the classroom session explained in Section 3. The instructor must file the Driver Evaluation Forms in a safe place so they are available for the post-training drives but not accessible to trainees.

2.2 Pre-training drive in a simulator

Conducting the pre-training drive in a simulator provides certain advantages:

- The simulator does not create CO_2 emissions.
- Various driving scenarios are programmed in the simulator, which can save the instructor time when route planning.
- The simulator has a built-in data collection system and provides a printed report for each trainee at the end of each drive.
- The reports are stored in the simulator database, so they can be regenerated if they are lost or the instructor forgot to print them.
- Using the simulator reduces the need for the instructor to ensure he/she records data manually for each drive.

To be effective for this type of training, the simulator must have at least three screens to provide the driver with a 180° view.

One potential disadvantage of using the simulator is that some drivers experience Simulator Adaptation Syndrome (SAS). This is motion sickness that results from the fact that the driver's eyes are close-focusing on the screens but are seeing a realistic driving scenario that appears to involve long distances. The confusion between where the eyes are focusing and what they are seeing causes some people to feel queasy. This effect can be reduced by sucking peppermints and minimizing the time spent on the simulator.

Before starting the pre-training drive, the instructor must

- plan the test route
- schedule time on the simulator
- obtain Driver Evaluation Forms, a clipboard, pens and a calculator

Three-screen driving simulator

Planning the test route

Base the route selection for the simulator practicum on the trainees' normal driving conditions. For drivers who normally do city driving with frequent deliveries, the test route through an urban area should be selected from the programmed scenarios in the simulator. For highway drivers, the chosen scenario should be mostly on the highway, but include some city driving because these drivers do exit the highway and go into cities. If the class includes drivers from both categories, select two scenarios for the two groups of drivers.

City route

Specifications

- About 5 to 8 min. of driving time to avoid SAS.

Makeup

- 75 percent collector roads, truck routes and industrial roads with moderate to heavy traffic volumes and maximum speeds of up to 60 km/h
- 25 percent highway with maximum speeds ranging from 80 to 100 km/h

Road conditions

- Include both incline and decline hill conditions.

Highway route

Specifications

- About 5 to 8 min. of driving time to avoid SAS.

Makeup

- 75 percent highway with maximum speeds ranging from 80 to 100 km/h
- 25 percent collector roads and industrial roads with moderate to heavy traffic volumes and maximum speeds of up to 60 km/h

Road conditions

- Include both incline and decline hill conditions.

Programming an appropriate vehicle

For the pre-training drive, program the simulator as a tractor and fully loaded trailer that are similar to those driven during the trainees' regular workday. The instructor should note the route and truck characteristics used on the simulator, so they can be repeated for the post-training drive.

Scheduling time on the simulator

The instructor must book time on the simulator allowing 30 to 45 min. per trainee. Time surplus to driving time is required for paperwork, such as completing the log book, checking the trainee's driver licence and filling out the Driver Evaluation Form. If any of the trainees have not used the simulator before, allow extra time for them to drive a familiarization scenario, so they can become accustomed to the handling characteristics, transmission and size of the vehicle.

Driver Evaluation Form

Before the pre-training drive, the instructor must obtain enough copies of the Driver Evaluation Form for the expected number of trainees and a clipboard, pens and a calculator.

Instructor and driver in a simulator

Conducting the pre-training drive

Preparation

- Complete the top of page 1 of the Driver Evaluation Form.
- Make sure that the trainee is comfortable with operating the simulator.
- If the trainee has no experience in the simulator, help him/her to adjust the driver's seat and explain the operation of all the controls, emphasizing how they are the same as in a tractor.
- To familiarize the driver with the simulator, load a basic highway scenario and coach the trainee through it. Have the trainee make some lane changes and get used to how the simulated rig handles, where it sits on the road and how things look in the mirrors (no more than 5 min.). It is important to get the trainee to keep his/her eyes moving (frequent mirror checks, etc.) because this reduces the chance of SAS.
- After the trainee completes the familiarization scenario, ask how his/her experience was.
- Most trainees will compare the experience to driving their trucks and point out how it was different.
- Remind the trainee that it is a simulator, and it will feel a bit different, somewhat like when his/her truck is in the shop and he/she has to drive the spare tractor. The trucks all feel different, and it just takes a bit of time to adjust.
- It's important not to talk about SAS because that will increase the likelihood of it causing problems for the trainees, who will then warn their coworkers about it, which tends to predispose them to it.

Drive the test route

- After the trainee is comfortable using the simulator, load the previously planned route.
- Make notes on the trainee's performance – on such topics as momentum management, idling, progressive shifting and speed management – for coaching on the post-training drive.
- Provide driving directions and avoid coaching the trainee on technique.
- Make small talk to keep the trainee relaxed.
- When the scenario is completed, discuss the report and print a copy for your records.
- Record the end time of the drive and data from the data-gathering device in the Pre-training drive column on the back page of the Driver Evaluation Form.

After all the trainees have completed their pre-training drives, the instructor may decide to use data from the Driver Evaluation Forms to prepare for the classroom session detailed in Section 3. The instructor must file the Driver Evaluation Forms in a safe place such that they are available for the post-training drives but are not accessible to the trainees.

3.1 Introduction

The pre-training component of the on-road practicum (in-vehicle or in the simulator) provides baseline data that can be used to support the training outcomes. The data provide specific fuel consumption numbers and information about driving habits for the classroom instructor to use to reinforce learning. Individual results for economical driving or good/bad habits must be discussed in broad terms with the group as a whole without singling out any driver.

Use the worksheet on pages 18 and 19 to prepare numbers from your group of drivers before you go into the classroom.

By using only the pre-training results, you can create a quick chart for the range of results in L/100 km.

If the pre-training data are in mpg imp. or mpg U.S., convert them to L/100 km by using one of the following formulas:

L/100 km = 235.2/mpg (U.S.)

L/100 km = 282.5/mpg (imp.)

The following table is an example of fuel consumption results that were recorded in mpg (imp.) and converted to L/100 km:

	Fuel consumption	
	mpg (imp.)	L/100 km
Driver A	6.83	41.4
Driver B	6.41	44.1
Driver C	7.74	36.5
Driver D	6.03	46.8
Driver E	7.29	38.8

You can now create the following chart on the whiteboard in the classroom, by listing the L/100 km numbers from lowest to highest:

L/100 km	Fuel consumption (lowest to highest)	Percentage
36.5	Set lowest fuel consumption to 100%	100
38.8	Divide 38.8 by 36.5 to obtain a percentage	106
41.4	Divide 41.4 by 36.5 to obtain a percentage	113
44.1	Divide 44.1 by 36.5 to obtain a percentage	121
46.8	Divide 46.8 by 36.5 to obtain a percentage	128

This simple chart will allow you to start a discussion around driving habits and the important role that professional drivers play in the profitability of the carrier or owner/operator every day.

At this point, ask the drivers how often they fuel their tractors (remember, some may be city drivers; others, highway drivers) and how much fuel they put in them. Take a number that is an average of those offered and do the following calculation on the board (we will use 300 L per day):

300 L × 5 days/week × 50 weeks/yr = 75 000 L/yr

At the price of $1.30/L, that is $97,500 per year. If we look back at the original fuel consumption chart and take the difference between the lowest and highest fuel consumption, we can now demonstrate the impact that drivers' decisions have on the profitability of the carrier as well as on the amount of CO_2 emissions.

If 75 000 L are used by the best driver, who is driving 36.5 L/100 km (7.74 mpg (imp.)), the driver who uses 128 percent as much fuel will use

75 000 L × 128 ÷ 100 = 96 000 L

This results in an estimated inefficiency of

(96 000 − 75 000) L = 21 000 L per tractor per year

or $27,300 per tractor per year

and

21 000 L × 2.7 kg/L = 56 700 kg of CO_2 emissions per unit

or 56.7 tonnes of CO_2 emissions per unit

Next ask the trainees, "How many vehicles are in your fleet?" Suggest that if half of those vehicles could make this kind of improvement, the impact on your carrier's bottom line and financial stability would be very positive. Then ask, "Could this make it possible for your carrier to increase your wages or bonus structure?"

Also ask, "Would you be reducing CO_2 emissions?"

Then introduce the training:

"The SmartDriver for Highway Trucking (SDHT) program that we are going to take today will provide additional information and techniques to help you improve your abilities as a professional driver and increase the positive impact you have every day at work.

The four most important points to understand as you take this program and return to work are as follows:

- Momentum management!
- Eliminate unnecessary idle time!
- Use progressive shifting techniques!
- Manage your speed!

Understanding, practicing and implementing these ideas will immediately reduce your carbon footprint and save you money at the fuel pump. The more efficiently you can operate a vehicle, the more in demand you will be as a professional driver!"

In the trucking world, fuel savings (cost reduction) has been the primary motivator for most carriers in the past. In many managers' eyes, it continues to be more important than CO_2 reductions. One of the primary purposes of SDHT is to reduce CO_2 emissions, which is becoming a mainstream issue in the trucking industry because progressive shippers require carriers to provide green bids for their business. Playing both sides of the fence (fuel savings/CO_2 reductions) allows the instructor to gain the maximum buy-in from workshop participants.

Worksheet for the classroom introduction

Using the Driver Evaluation Forms from the pre-training drives, list the fuel consumption (L/100 km) achieved by each trainee in Table 1 (below). Do not identify the trainees by name.

If the pre-training data are in mpg (imp.) or mpg (U.S.), an extra step will be required to convert them to L/100 km by using one of the following formulas:

L/100 km = 235.2/mpg (U.S.)

L/100 km = 282.5/mpg (imp.)

Table 1

	Fuel consumption	
	mpg (imp.)	L/100 km
Driver A		
Driver B		
Driver C		
Driver D		
Driver E		
Driver F		
Driver G		
Driver H		
Driver I		
Driver J		

Now list the fuel consumption numbers from lowest to highest in the left column of the Table 2:

Table 2

Fuel consumption (lowest to highest) (L/100 km)	Fuel consumption as a percentage of the best result (%)
	100

The lowest (best) result is automatically assigned 100 percent. For the other fuel consumption values, you can calculate the percentage as follows:

$$\frac{\textbf{fuel consumption}}{\textbf{lowest fuel consumption}} \times 100\%$$

Write the numbers from Table 2 on a whiteboard or flip chart in the classroom, to use during your discussion.

To calculate litres used per year by a tractor-trailer, fill in the average L/day suggested by the trainees.

Average L/day = _____ (A)

Average L/yr = _____ (A) × 5 days per week × 50 weeks per yr = _____ (B)

Cost/yr = _____ (B) × $1.30/L = $ _____ (C)

Assume that the driver with the lowest fuel consumption (best) uses the average litres per year (B) calculated above.

To calculate the fuel that will be used by the driver with the highest fuel consumption, use the following formula:

Fuel/yr = _____ (B) * highest percentage in Table 2 ÷ 100 = _____ L (D)

Estimated inefficiency = _____ (D) − _____ (B) = _____ (E) L per tractor per year

Additional cost: _____ (E) × $1.30/L = $ _____ (F) per tractor per year

Additional CO_2 emissions = _____ (E) L × 2.7 kg/L = _____ kg (G)

= _____ kg (G) ÷ 1000 = _____ tonnes

3.2 Monitoring driver progress

If the driver group you are working with has access to data loggers continuously, it is important that you do two things. First, near the end of the classroom session, ensure that they understand how to operate the data logger. Secondly, encourage them to use this resource to monitor and improve their habits. If they create the habit of zeroing the leg portion of the data logger at the beginning of every shift, they can track and record their results daily.

If data loggers are unavailable to them, they can use a form such as the one below to manually track their results. If they are sharing a truck with another driver and both drivers fuel the truck, it will be important for them to fill the tank(s) to the same level each time. You will need to emphasize that the drivers must fill the fuel tanks to the same level after every shift, to measure fuel use accurately.

Date	**Odometer – start of shift**	**Odometer – end of shift**	**Distance driven** (km or miles)	**Fuel used** (L or gal.)	**Fuel consumption** (L/100 km)	**Fuel economy** (mpg)
			(odometer shift end – odometer shift start)	(fuel added at end of shift)	$\frac{L \times 100}{km}$	$\frac{mi.}{gal.}$

The Fuel Consumption Calculator available from Natural Resources Canada also provides an easy way to calculate fuel consumption or fuel economy. Visit **FleetSmart.gc.ca** and click on E-tools to access the Fuel Consumption Calculator.

The post-training drive is designed to allow the instructor to coach individual trainees on applying the lessons from the SDHT classroom session. The drive also allows the instructor to help each driver correct bad habits that were noticed during the pre-training drive. Finally, the post-training drive provides actual data about each driver's fuel consumption that can be compared with the pre-training data to show the effectiveness of the techniques taught in the SDHT course. To provide useful data, the post-training drive must be conducted in the same vehicle or simulator used for the pre-training drive.

4.1 Post-training drive in a vehicle

Before starting the post-training drive, the instructor must

- collect the notes about the test route used for the pre-training drive
- schedule the use of the same vehicle used in the pre-training drive
- test the data-gathering technology
- obtain the Driver Evaluation Forms from the pre-training drives, a clipboard, pens and a calculator
- ensure that the pre-trip inspection of the tractor and trailer and appropriate documentation has been completed

If at all possible, the route, vehicle, load and weather conditions for the post-training drive should be identical to those used in the pre-training drive. It is important that the instructor test the data-gathering technology on the selected vehicle before starting the post-training drives, to ensure that the expected data are being collected.

Conducting the post-training drive

The instructor and the first trainee must ensure the pre-trip inspection has been completed and documented. Do not repeat the pre-trip inspection for subsequent drives on the same day.

Once inside the tractor, the instructor must

- inspect the trainee's driver licence to ensure that it is valid
- have the trainee complete his/her log book or log-on to the electronic data-gathering device, as appropriate
- complete the column for the post-training drive on page 1 of the Driver Evaluation Form
- ensure that the trip recorder on the data-gathering device is set to zero
- direct the trainee to drive the planned route
- coach the trainee on such topics as momentum management, idling reduction, progressive shifting and speed management
- make small talk to keep the trainee relaxed
- ensure that the trainee logs out of the data-gathering device as soon as the drive is completed
- record the end time of the drive and data from the data-gathering device in the post-training drive column on the back page of the Driver Evaluation Form
- sign the Driver Evaluation Form and have the trainee sign the form

COACHING TIPS:

Momentum management

Momentum management means planning ahead to keep the truck rolling with a minimum of fuel, by finding the sweet spot and avoiding use of the throttle, brakes and engine brake. The driver should plan trips to combine tasks at one stop; e.g. refuelling, meal, shower and/or delivery. Once underway, the driver should look far ahead on the road and identify changing conditions (traffic flow, traffic lights, pedestrians, hills, low-speed turns, etc.) ahead of time. This practice allows the driver to adjust the vehicle speed while using the least amount of consumables (brakes and fuel). Combine coasting and using the engine brake to slow or stop, to minimize wear on the brakes. For example, simple things such as backing out of the throttle early when approaching an exit from the highway and allowing the vehicle energy (speed) to dissipate (coast down) saves the fuel required to maintain speed until the exit and saves the brakes that would have otherwise been required to slow enough for the exit ramp.

Coach the driver to

- slow down by easing up on the throttle, coasting in the sweet spot where no fuel is used, and finally releasing the throttle completely to allow the engine brake to engage
- allow the vehicle to slow before entering a turn. Ensure that the driver is in the correct gear to pull the trailer(s) through the turn, accelerating on exit.
- apply the following distance rule of thumb: allow 1 second for every 3 metres (10 feet) of vehicle length. Explain that proper following distance allows more time to react to changing conditions while still maintaining momentum.
- anticipate changing conditions by being aware of surroundings – what is ahead, behind and beside the vehicle
- be aware of traffic lights – did they just change? Are they about to change? Does the pedestrian light provide clues as to when the light will change?
- expect the unexpected!

Eliminate unnecessary idle time: The engine should always be off unless it is performing some kind of work (building air pressure, etc.). Drivers need to create habits that support this objective, such as not having the engine running when they are completing paperwork. Shut the engine off during loading, off loading, inspections, brake checks, etc.

Progressive shifting: Ensure that the driver is up-shifting to the next highest gear at the lowest possible revolutions per minute (rpm) that will keep the vehicle accelerating. Acceleration rabbits do not win the fuel consumption race. Coach the driver to take advantage of the half gears, if he/she is driving a 13- or 18-speed transmission. This keeps the rpm down all day because, with the smaller steps in these gears, your shift point can stay down in the peak torque range (1200–1500 rpm).

Speed management: This is similar to momentum management except for the reinforcement of the fact that simply slowing down will reduce your fuel consumption and the wear and tear on your vehicle! Generally, every 10 km/h above 90 km/h burns about 10 percent more fuel.

4.2 Post-training drive in the simulator

Before starting the post-training drive, the instructor must

- collect the notes about the simulator scenario(s) used in the pre-training drive
- schedule time on the simulator, allowing 15 min. per trainee
- obtain Driver Evaluation Forms from the pre-training drives, a clipboard, pens and calculator

It is important that each trainee drives the same route with the same settings for tractor, trailer and load that were used during the pre-training drive. This practice ensures that the results for the two drives are comparable.

Conducting the post-training drive

Once inside the simulator, the instructor must

- complete the column for the post-training drive on page 1 of the Driver Evaluation Form
- direct the trainee to drive the planned route
- coach the trainee on such topics as momentum management, idling reduction, progressive shifting and speed management (see Coaching Tips in Section 4.1)
- make small talk to keep the trainee relaxed
- after the scenario has been completed, discuss the report and print a copy for your records
- record the end time of the drive and data from the data-gathering device in the post-training drive column on the back page of the Driver Evaluation Form
- sign the Driver Evaluation Form and have the trainee sign the form

After the post-training drive has been completed, the instructor should calculate the percentage change in fuel consumption and CO_2 emissions and enter them on the back page of the Driver Evaluation Form.

Fuel consumption

	Units	Pre-training drive	Post-training drive	Change (%)
Change in fuel consumption	L/100 km	A	B	$\frac{(B - A) \times 100}{A}$

For example:

	Units	Pre-training drive	Post-training drive	Change (%)
Change in fuel consumption	L/100 km	62.2	58.1	$\frac{(58.1 - 62.2) \times 100}{62.2}$ $= -6.5$

CO_2 emissions

Because CO_2 emissions are directly proportional to the amount of fuel used, a percentage reduction in fuel use provides the same percentage reduction in CO_2 emissions. So, in the case above, the percentage reduction in CO_2 emissions is 6.5 percent.

For conversion from mpg use the following formulas:

$$L/100\ km = \frac{235.2}{mpg\ (U.S.)}$$

$$L/100\ km = \frac{282.5}{mpg\ (imp.)}$$

6 Discuss the test results

After the form has been completed, discuss the percentage improvement or lack of improvement with the trainee. Explain how to improve any questionable habits noted during the two training drives. Reinforce coaching points. Emphasize how reductions in fuel consumption will add up, resulting in dollar savings and reductions in CO_2 emissions. Give the trainee a copy of the Driver Evaluation Form, and file a copy of the form for your records.

Important note regarding on-road test results

Unfortunately, when conducting tests on the road, it may be difficult to hold driving conditions constant. For example, the pre-training drive may have been conducted in light traffic, but bad weather and heavy traffic may be encountered on the post-training drive. In this case, the driver may not show a reduction in fuel consumption even though he/she has learned the SmartDriver techniques and is using them properly.

The best advice is to try to complete the pre-training and post-training drives under similar driving conditions. This may mean rescheduling one of the drives until the weather clears. Another option is to try to conduct the pre- and post-training drives on the same day. If it turns out that the driving conditions are different, note it on the first page of the Driver Evaluation Form in the section titled Driving conditions.

When discussing results, explain the impact the different driving conditions may have had on fuel consumption. In the case above, heavy traffic could have increased the percentage of idling time and overall fuel use. Use the results as an opportunity to show that driving conditions also impact fuel consumption and that, where possible, smart drivers use trip planning to avoid rush hour and other road delays.

Also mention that many companies have documented significant fuel savings in the year following SmartDriver training and that a year is a more accurate measure of success. The reason is that over a year, the short-term driving conditions that affected drivers' results tend to average out. Draw their attention to the numerous FleetSmart profiles that document real-world savings following SmartDriver training.

Natural Resources Canada's Office of Energy Efficiency

Leading Canadians to Energy Efficiency at Home, at Work and on the Road

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