California Environmental Protection Agency

Air Resources Board

2nd PROPOSED MODIFICATIONS TO

Vapor Recovery Test Procedure

TP - 201.2D

Post-Fueling Drips_From Nozzles ~~Spouts~~

Adopted: February 1, 2001
Amended:

Note: Proposed 15-day changes (May 9, 2003) are shown with double underline for addition and ~~double strikeout~~ for deletion. Proposed 15-day changes (July 17, 2003) are shown with ***bold italics*** for addition and ~~SMALL CAP STRIKEOUT~~ for deletion. [Bracketed text] is not part of the proposed amendments.

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Vapor Recovery Test Procedure

TP-201.2D

Post-Fueling Drips from Nozzles ~~Spouts~~

A set of definitions common to all Certification and Test Procedures is in:

D-200 Definitions for Vapor Recovery Procedures

For the purpose of this procedure, the term "CARB" refers to the California Air Resources Board~~,~~; the term "Executive Officer" refers to the CARB Executive Officer, or his or her authorized representative or designate; and the term "CP-201" refers to CARB CP-201 Certification Procedure for Vapor Recovery Systems at Gasoline Dispensing Facilities.

1. PURPOSE AND APPLICABILITY

1.1 The purpose of this procedure is to quantify ~~liquid~~ gasoline drips from nozzles following ~~re~~fueling events. It is applicable, during the certification process, for determining compliance with the performance standard for the maximum allowable number of ~~liquid~~ gasoline drips as defined in CP-201. ~~the Certification (CP-201).~~

1.2 The term "drip" is used for consistency throughout this test procedure. However, other CARB documents may use the terms "drip" and "drop" interchangeably.

2. PRINCIPLE AND SUMMARY OF TEST PROCEDURE

~~**2.1** The vapor recovery nozzles and associated hanging hardware are inspected and verified to be in good working order, as specified in CCR, title 17, section 94006, including the requirement that the nozzle's primary shutoff mechanism is in good working order.~~

~~**2.2**~~

2.1 The vapor recovery nozzle is used to dispense gasoline into a vehicle fuel tank. Upon activation of the nozzle's primary shutoff mechanism, ten (10) seconds are allowed to elapse prior to removal of the nozzle from the vehicle fillpipe. The nozzle is then ~~inverted~~ removed and the number of drips of ~~liquid~~ gasoline are quantified. ~~for a period of five (5) seconds.~~

~~**2.3**~~

2.2 Compliance with the performance standard specified in CP-201 shall be determined using the ~~combined~~ average result of ~~the ten~~ all test runs ~~for each~~ from all the nozzles tested. A minimum of ten nozzles shall be tested for certification.

3. BIASES AND INTERFERENCES

3.1 Nozzle orientation during ~~refueling~~ dispensing can affect the response time of the primary shutoff mechanism. To eliminate this bias, the nozzle shall be inserted into each vehicle fillpipe in the same orientation~~,~~ as specified in Section 7.

~~**3.2** Nozzles or associated components that have defects pursuant to title 17, CCR, section 94006 may bias the test toward non-compliance. Do not conduct this test during the certification process if the nozzle, or any associated component contains a defect.~~

~~**3.3**~~

3.2 Spitback may bias the results of the test procedure toward noncompliance. During the certification process, spitback occurrences shall be noted on the Field Data Sheet (Form 1). ~~Results~~ If spitback is attributable to vehicle fillpipes that do not meet the requirements of title 13**,** CCR, section 2235, the data for that run shall not be ~~included~~ used in the calculations.

3.3 Based on graduations of the specified cylinder, gasoline that exits the nozzle as a trickle, and measures less than 0.3 milliliters (0.3 ml) will be reported as 2.5 drips. This technique will bias the results toward compliance.

3.4 Based on variations in gasoline product grade and fuel composition, the conversion of one milliliter (1 ml) as equal to 20 drips may underestimate the actual number of drips and the conversion may bias the result toward compliance.

4. SENSITIVITY, RANGE, AND PRECISION

4.1 The procedure is capable of determining spills as small as one ~~drop~~ drip per ~~re~~fueling event.

4.2 The sensitivity of the procedure is ~~1~~one drip/~~re~~fueling event. ~~and~~ In addition, the precision ~~is ±~~ ranges from one ~~1~~ drip/~~re~~fueling event to 0.3 milliliter (0.3 ml) per fueling event, for less than ten milliliters (10 ml).

4.3 For the purpose of the test procedure, a ~~re~~fueling event shall consist of any vehicle ~~re~~fueling event of at least 4.5 gallons, terminated by activation of the nozzle's primary shutoff mechanism.

5. EQUIPMENT

5.1 Field Data Sheet. Use a Field Data Sheet, such as Form 1, to record testing information. ~~the number of drips from each acceptable refueling event, as defined in Section 4.3.~~

5.2 Nozzle Data Sheet. Use a Nozzle Data Sheet, such as Form 2, to record nozzle information.

~~**5.2**~~ **5.3** ~~Stopwatch.~~ Timing device. Use a timing device ~~stopwatch, equipped with a split timing function,~~ accurate to within 0.2 seconds, capable of indicating time in increments of one (1) second. ~~to determine the dispensing rate. The split function shall be used to determine~~

~~the 10-second specification in Section 7.6 of the procedure. Two stopwatches may be used instead of using a split timing function.~~

5.4 Graduated cylinder. Gasoline resistant, non-breakable graduated cylinder. Use a ten milliliter (10 ml) graduated cylinder with the scale beginning at 0.3 milliliters (0.3 ml) and minimum graduations of 0.1 milliliters (0.1 ml).

5.5 Level. Level to verify attitude of nozzle.

5.6 Funnel. Gasoline resistant, non-breakable funnel of appropriate size for use with the graduated cylinder. If a bellows-equipped nozzle is tested, use a funnel wide enough to capture all drips from the nozzle boot.

5.7 Gasoline container. Gasoline container in which to empty the cylinder.

5.8 Tape, scribe or marking device. Use to mark nozzle attitude.

5.9 Other Equipment. Gasoline resistant gloves. Use to protect skin.

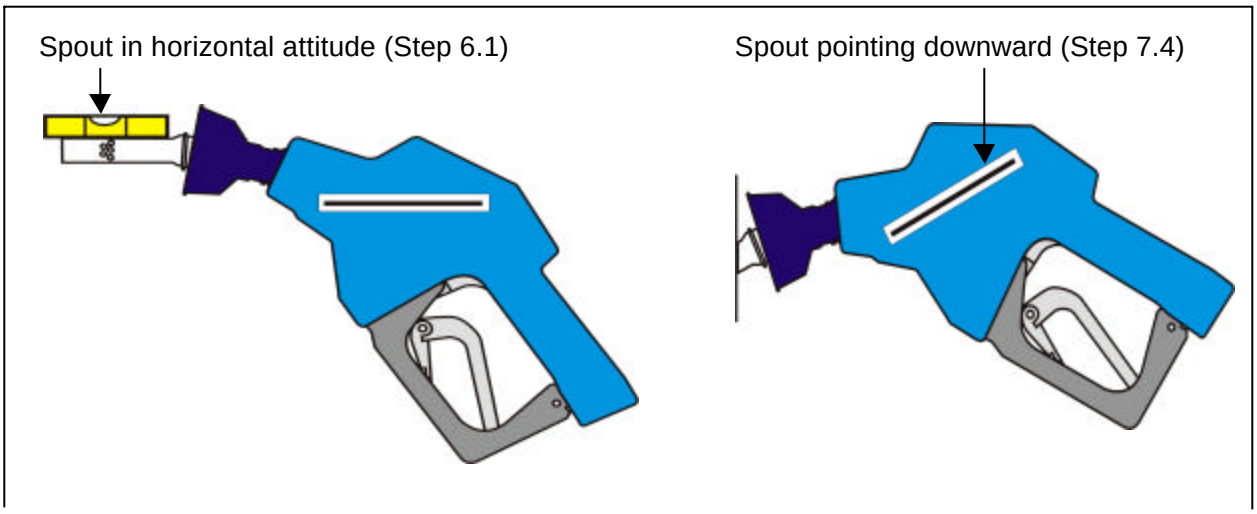
6. PRE-TEST PROCEDURES

6.1 Obtain the attitude of spout tip by placing the nozzle against the dispenser to hold nozzle steady. Using the level, position the spout tip horizontal (parallel) to the ground. With tape or a scribe, mark a visual indicator of this attitude on both sides of nozzle (See Figure 1). ~~Inspect the vapor recovery nozzles and associated hanging hardware and verify that all components are in good working order, as specified in title 17, CCR, section 94006, including the requirement that the nozzle's shutoff mechanism is in good working order.~~

6.2 Enter nozzle information on Nozzle Data Sheet (See Form 2).

[ADD FIGURE 1 BELOW]

Figure 1
Nozzle Attitude



7. TEST PROCEDURE

~~**7.1** Assign, and record on the Field Data Sheet, a Survey ID # to each vehicle included in the test.~~

~~**7.2**~~

7.1 The tester shall select a vehicle for the test by choosing the next vehicle that appears~~,~~ for which the ~~re~~fueling event is about to begin.

~~7.2.1~~

7.1.1 ~~THE TESTER SHOULD INTRODUCE~~ ~~themselves~~ ~~THEMSELF TO~~ ***Ask*** the customer ~~AND ASK~~ if the ~~re~~fueling event is to be a fillup. If the answer is no, the tester shall select the next potential ~~TEST~~ vehicle.

~~7.2.2~~

7.1.2 If the customer acknowledges that they want a fillup, the tester should ask to ~~re~~fuel the vehicle, explaining the purpose and details of the test.

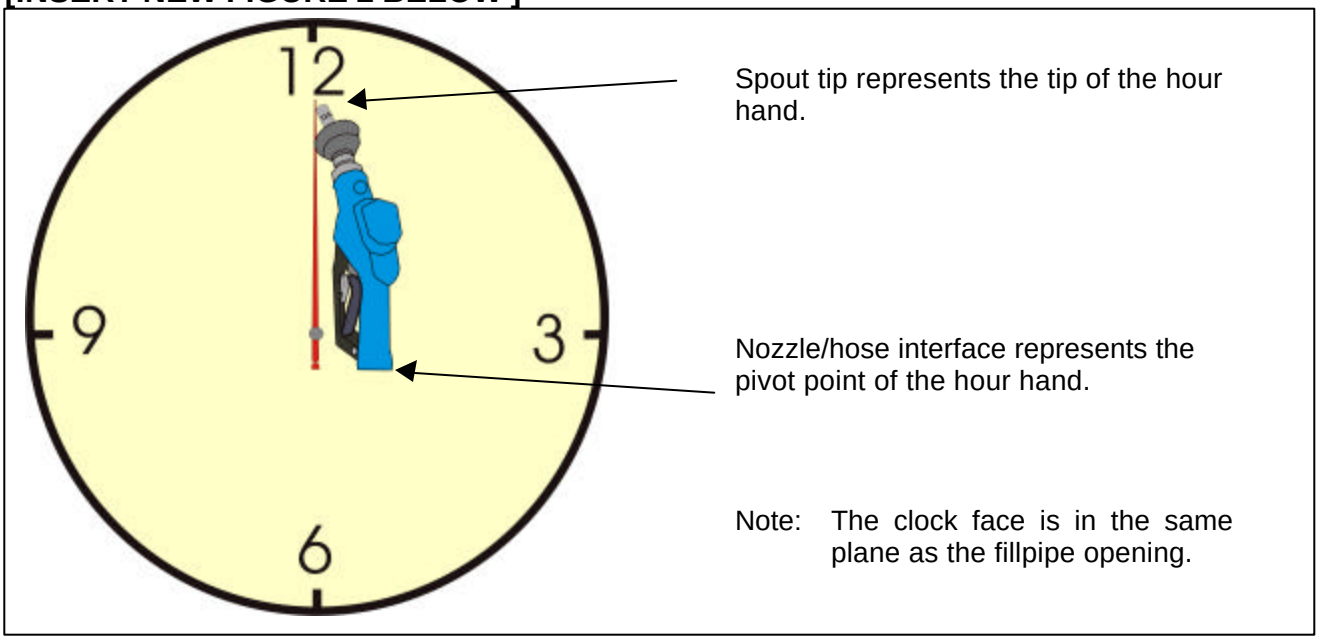
7.2 Verify that the ten milliliter (10 ml) graduated cylinder is empty. Position the funnel into the graduated cylinder.

7.3 Remove nozzle from the dispenser holster and ~~Properly~~PROPERLY insert the nozzle spout into the vehicle fillpipe~~., with~~. Position the nozzle ~~handle pointed downward~~ in the 12:00 o'clock orientation for side fill vehicles and as close to a 12:00 o'clock orientation as ~~TECHNICALLY~~ feasible for rear fill vehicles. See Figure ~~1~~2 for nozzle orientations.

7.4 Position the tip of the spout downward into the fillpipe. Using the visual indicator on the nozzle, verify that the attitude of the nozzle tip is pointing downward, shown by the back of the visual indicator being in an elevated position (see Figure 1). If there is any uncertainty, place the level along the visual indicator and verify that the bubble is away from the vehicle.

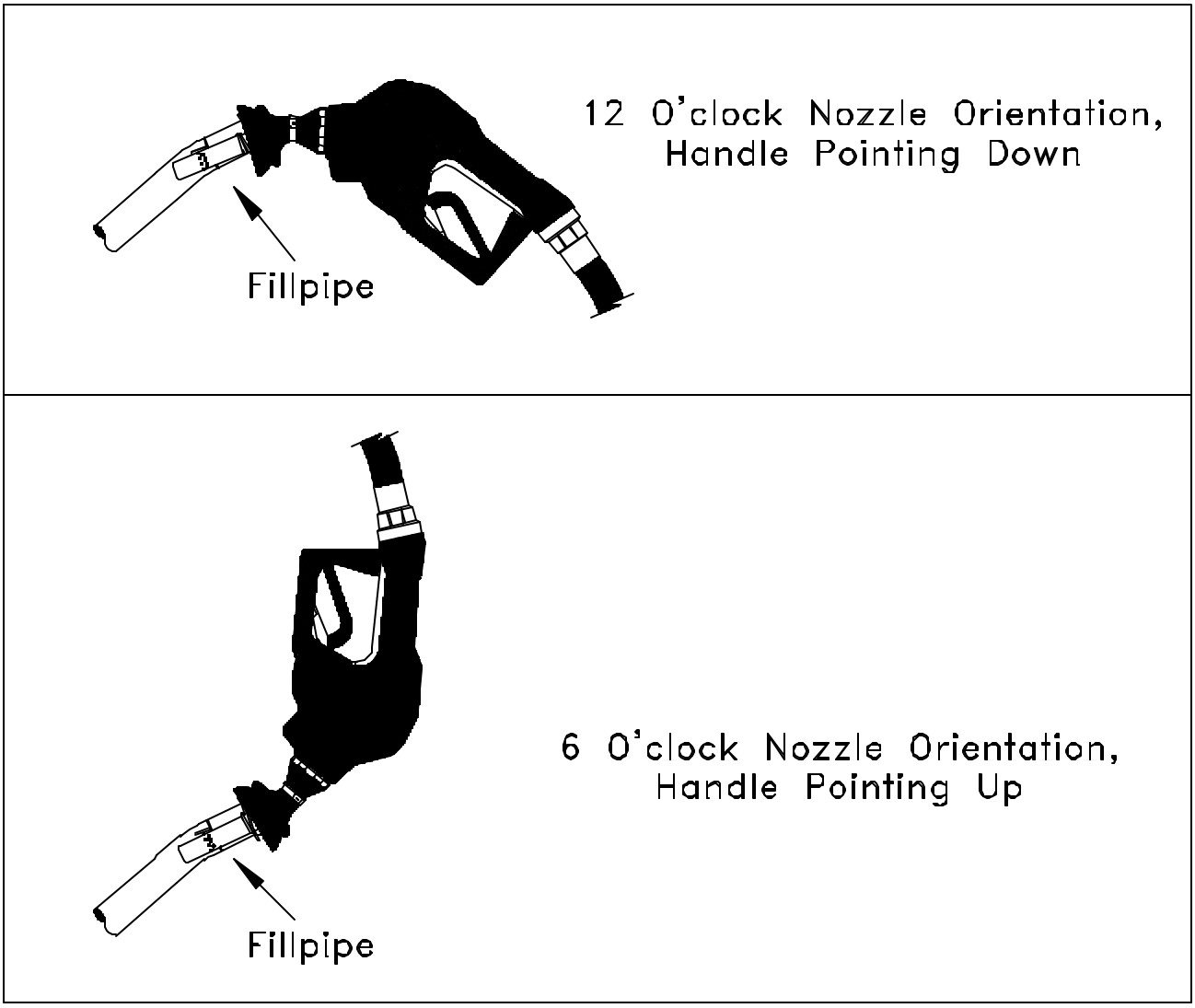
Figure 2
Nozzle Orientation at the 12 o'clock position

[INSERT NEW FIGURE 2 BELOW]



[DELETE FIGURE 1 BELOW]

~~**Figure 1**~~
~~**Nozzle Orientations**~~



~~**7.4**~~

7.5 Begin dispensing with the nozzle trigger in the hand-held, wide open position to achieve the maximum dispensing rate. Set the nozzle on high clip. Start ~~the stopwatch~~ timing when dispensing begins.

~~**7.5**~~

7.6 Upon activation of the nozzle's primary shutoff mechanism, stop the timing for ***the*** dispensing rate determination and verify that at least 4.5 gallons were dispensed. ~~, start the stopwatch used to determine the 10 second specification in Section 7.6. Record the gallons dispensed, the time required for the refueling event, and note if spitback occurred.~~ WAIT FOR TEN (10) SECONDS BEFORE REMOVING THE NOZZLE FROM THE VEHICLE FILLPIPE.

~~**7.6** Using a stopwatch, wait for ten (10) seconds before removing the nozzle from the vehicle~~

~~fillpipe.~~

7.6.1 ~~After ten seconds, c~~C~~AREFULLY REMOVE THE NOZZLE, KEEPING THE SPOUT POINTING DOWNWARD UNTIL THE SPOUT TIP EXITS THE FILLPIPE. ~~***Wait for ten (10) seconds before removing the nozzle from the vehicle fillpipe. While removing the nozzle, keep the spout pointing downward.*** Commence counting drips as soon as the ***spout*** ~~NOZZLE~~ clears the fillpipe. ~~Immediately t~~Tilt the ~~nozzle~~ spout tip such that the spout is ~~vertical,~~ pointing straight upward.

7.6.2 ~~Pointing the nozzle away from the vehicle and customer, ~~Moving the nozzle away from the vehicle, ~~PROMPTLY~~ tilt the nozzle ~~downward~~ until the spout tip is ~~vertical,~~ pointing straight downward over the funnel, and hold for five (5) seconds***, keeping***~~. HOLDING~~ the nozzle as still as possible***.*** ~~, CONTINUE COUNTING THE NUMBER OF DRIPS drops OF liquid GASOLINE THAT SPILL FROM THE NOZZLE.~~ At the end of ***the*** five (5) seconds ***counting interval***, remove the measuring equipment from beneath the spout***, and discontinue counting***. ~~for five seconds, starting with the initial downward tilting through having the nozzle in an inverted position. Record this quantity on the Field Data Sheet along with the number of gallons dispensed and the refueling time, in seconds. For the purpose of this measurement, a drip shall consist of a maximum volume of 1/15 of a milliliter.~~ After each measurement, empty the graduated cylinder.

7.6.3 ***From the time the spout exits the fillpipe, to the end of the five (5) second counting interval, any g***~~G~~asoline that exits the nozzle as a trickle will be counted as 2.5 drips and will be added to any drip(s) observed for the sum of that run. ~~IN ADDITION, Q~~***Q***uantities of gasoline measuring 0.3 milliliters (0.3 ml) or greater will be noted on the Field Data Sheet in milliliters. If the gasoline collected measures less than 0.3 milliliters (0.3 ml), an "X" will be used for recording a value for milliliters.

7.7 ~~Conduct ten test runs, pursuant to Sections 7.1 through 7.6, on each of the applicable nozzles installed at the test site. ~~Conduct at least ten test runs on each of a minimum of ten nozzles, following the procedures specified in Sections 7.1 through 7.6.3. Record data for each run on the Field Data Sheet. When measuring gasoline in the graduated cylinder, record in milliliters on Field Data Sheet; do not convert to drips.

~~**8. POST-TEST PROCEDURES**~~

~~**8.1** Calculate the average of the number of drips of liquid gasoline from each of the refueling events included in the test. Record this average to the nearest tenth of a drip on the Field Data Sheet.~~

~~**9.**~~

8. CALCULATING RESULTS

~~**9.1**~~

8.1 Calculate the dispensing rate for each ~~re~~fueling event as follows:

$$Q_d = \left(\frac{(G_d)(60)}{t_d} \right) \qquad \text{Equation } 9-1$$

[*ABOVE EQUATION 9-1 TO BE DELETED*]

$$Q = \frac{(G)(60)}{t} \qquad \text{Equation } 8-1$$

[*ABOVE IS NEW EQUATION 8-1 TO BE INSERTED*]

Where:

Q_d = Dispensing rate, gallons/minute
G_d = ~~Quantity of g~~Gasoline dispensed during the ~~re~~fueling event, gallons
t_d = ~~Time to dispense G_d gallons~~ Duration of fueling event, seconds
60 = Conversion factor from seconds to minutes

~~**9.2**~~

8.2 Convert run results expressed in milliliters to drips. For conversion purposes, one milliliter (1 ml) equals 20 drips. Runs that have recorded values for drips and for milliliters shall be calculated using the value that represents the higher amount of drips. Calculate the average result of all test runs from all the nozzles as follows: ~~the arithmetic average for both each nozzle and all nozzles of the number of drops for each refueling event as follows:~~

$$N_{drips} = \sum_{i=1}^{n} \left(\frac{D_t}{n} \right) \qquad \text{Equation } 9-2$$

[*ABOVE EQUATION 9-2 TO BE DELETED*]

$$\overline{D} = \frac{d}{n} \qquad \text{Equation } 8-2$$

[*ABOVE IS NEW EQUATION 8-2 TO BE INSERTED*]
Where:

~~N_{drips}~~ $\overline{D}$ = Average number of drips for all ~~re~~fueling events, ~~drops~~ drips/~~re~~fueling event
~~D_t~~ d = Total of all ~~drops~~ drips from all ~~re~~fueling events, ~~drops~~ drips
n = Number of ~~re~~fueling events during test

~~**10.**~~

9. REPORTING RESULTS

~~**10.1**~~

9.1 Report the following information for post-fueling drips: ~~The results of the quantification of the number of drops per refueling event shall include:~~

~~10.1.1~~

9.1.1 All data shown in the Field Data Sheet and Nozzle Data Sheet.

~~10.1.2 The average number of drops for all nozzles tested, expressed to the nearest tenth of a drop.~~

~~10.1.3~~

9.1.2 The ~~combined~~ average result of all test runs for ~~number of drops for~~ all the nozzles tested, expressed to the nearest tenth of a ~~drop~~ drip.

~~**11.**~~

10. ALTERNATE PROCEDURES

~~**11.1**~~ This procedure shall be conducted as specified. Modifications to this test procedure shall not be used to determine compliance unless prior written approval has been obtained from the CARB Executive Officer, pursuant to Section 14 of Certification Procedure CP-201.

[DELETE THIS FORM 1]

Form 1

Field Data Sheet
POST – FUELING DRIPS

Facility:	Test Date:	Tester(s):
Address:	Phase II Equipment Type:	

Survey ID #										
Vehicle Information										
Year										
Make										
Model										
Refueling Information										
Nozzle Number										
Gasoline Grade										
Time Start										
Nozzle Position [1 - 12 O'clock]										
Gallons Pumped										
Fueling Time, seconds										
Dispensing Rate, gpm										
Spitback, Yes or No										
NOZZLE DRIP DATA										
# of Post-Fueling Drops										
TOTAL DRIPS										
Comments										

Nozzle Number	Number of Test Runs	Total Number of Post-Fueling Drips	Average Number of Post-Fueling Drips
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
TOTALS			

[INSERT THIS FORM 1] **Form 1** **Page _____ of _____**

TP 201.2D Field Data Sheet
POST – FUELING DRIPS

Facility:	Test Date:	Tester(s):
Address:	Phase II System Type:	

Vehicle Info										
Year										
Make										
Model										
Fueling Info										
Time of day										
Dispenser number										
Gasoline grade (e.g.: 87, 89, 91)										
Nozzle orientation (clock position)										
Nozzle tip downward? (Y or N)										
Duration of fueling										
Automatic shutoff? (Y or N)										
Fuel pumped (gallons)										
Spitback? (Y or N)										
Drip Data										
Drips measured	drips	drips	drips	drips	drips	drips	drips	drips	drips	drips
Milliliters measured	ml	ml	ml	ml	ml	ml	ml	ml	ml	ml

Comments: _____

_____

_____

_____

[INSERT THIS FORM 2]

Form 2
TP 201.2D Nozzle Data Sheet
POST – FUELING DRIPS

Facility:	Test Date:	Tester(s):

Address:	Phase II System Type:

Dispenser number						
Gasoline grade (e.g.: 87, 89, 91)						
Manufacturer						
Model number						
Serial number						
Date code						

Dispenser number						
Gasoline grade (e.g.: 87, 89, 91)						
Manufacturer						
Model number						
Serial number						
Date code						

Dispenser number						
Gasoline grade (e.g.: 87, 89, 91)						
Manufacturer						
Model number						
Serial number						
Date code						