



U.S. Department
of Transportation

**National Highway
Traffic Safety
Administration**

ODI RESUME

Investigation: PE 11-018
Date Opened: 05/11/2011
Investigator: Steve Mchenry
Approver: Frank Borris
Subject: Idle instability

Date Closed: 02/07/2013
Reviewer: Jeff Quandt

MANUFACTURER & PRODUCT INFORMATION

Manufacturer: Ford Motor Company
Products: MY 2005 through 2007 Ford Freestyle
Population: 168,720 (Estimated)

Problem Description: Vehicles may experience intermittent idle flare during low-speed driving maneuvers.

FAILURE REPORT SUMMARY

	ODI	Manufacturer	Total
Complaints:	1,926	1,412	4010**
Crashes/Fires:	0	0	0**
Injury Incidents:	1	0	1
Fatality Incidents:	0	0	0
Other*:	169	10	178**

*Description of Other: Low speed minor impacts. See attached for details.

** Total eliminates duplicates received by ODI and manufacturer.

ACTION / SUMMARY INFORMATION

Action: This Preliminary Evaluation is closed.

Summary:

On November 29, 2012, Ford Motor Company (Ford) initiated Customer Satisfaction Program 12N03 to extend warranty coverage terms for repair of engine idle RPM surge caused by throttle body deposits in all model year (MY) 2005 through 2007 Ford Freestyle, Five Hundred and Mercury Montego vehicles. The program extends the coverage for up to 10 years of service or 150,000 miles from the warranty start date of the vehicle (all vehicles are eligible for the program through May 31, 2013, regardless of mileage). Dealers will repair vehicles exhibiting the condition by removing and cleaning the throttle body and reprogramming the PCM with software containing an updated idle speed control strategy.

According to Ford, some of the affected vehicles may experience momentary, intermittent engine idle RPM surge (idle flare) when stopped or during low speed driving maneuvers such as in a parking lot or driveway. Unstable idle speed control (dips and flares) around the target engine speed (700 rpm) can occur in vehicles with deposit build-up in the throttle body when the system adjusts engine speed in response to changes in engine load, typically from power steering application or air-conditioner compressor cycling. Idle speed control logic is only active at vehicle speeds below 3.5 mph and when the accelerator pedal is not applied. Ford testing of a vehicle with a "worst case" throttle body measured a maximum idle flare of 1360 RPM lasting approximately 1 second, which Ford indicated was consistent with system design to limit vehicle speed and acceleration in idle control mode. Ford indicated that the test vehicle was held in place with normal brake effort and that vehicle speed remained under 4 mph without the brake pedal applied.

In addition to throttle body deposit accumulation, symptoms associated with the condition may include Check Engine lamp illumination and diagnostic trouble codes (DTCs) P0505, P0506 or P061B. Ford attributed the surge condition to changes in idle air flow resulting from the progressive buildup of deposits in the throttle body from normal Positive Crankcase Ventilation (PCV) system operation. This condition was not adequately compensated for in the

original Powertrain Control Module (PCM) calibration. Ford issued a technical service bulletin on August 15, 2011 (TSB 11-8-5), releasing an updated powertrain control calibration for vehicles with CVT transmissions. On October 19, 2011, Ford issued a second bulletin (TSB 11-10-21) superseding TSB 11-8-5 and including updated powertrain control calibration for vehicles with 6-speed transmissions.

Prior to Ford issuing the TSB's, owner's experiencing the alleged defect either received no repairs, if dealers could not duplicate the condition, or had the throttle body cleaned or replaced, which only provided temporary correction until the throttle deposit build-up returned. Ford's revised powertrain calibrations appear to be effective remedies for the idle instability caused by build-up of throttle body deposits. However, even after the TSB's were released, many owners experiencing the condition continued to have difficulty with proper diagnosis and repair as dealers were often either unable to duplicate the condition or were unfamiliar with the new repair procedures. Ford's new program addresses those concerns.

NHTSA's testing and complaint analysis indicate that the idle speed control issue in the subject vehicles can only occur at very low speeds, are very brief events, are easily controlled by moderate brake pedal forces and result in minor increases in vehicle speed even with no braking. This investigation is closed. The closing of this investigation does not constitute a finding that a safety-related defect does not exist. For additional information regarding this investigation, see complete closing resume in the document file for PE11-018.

ODI reviewed consumer complaints, information from Ford, and conducted extensive vehicle testing to assess the safety risks associated with the alleged defect in MY 2005 through 2007 Ford Freestyle vehicles equipped with continuously variable transmissions (CVT). The Freestyle vehicles accounted for approximately 36 percent of MY 2005 through 2007 Freestyle, Five Hundred and Montego production and approximately 86 percent of engine surge complaints to ODI, 88 percent of alleged impact incidents and all of the complaints alleging injuries.

Complaint Analysis. ODI has received 1,945 complaints related to the alleged defect in the subject vehicles, including 56 alleging, as indicated on their original complaint submission, minor impacts, usually with stationary objects in residential driveways, garages or commercial parking lots. Another 113 alleged experiencing minor impacts related to engine surge in response to questioning from ODI. The reporting displayed a seasonal pattern with complaint input peaking summer months, likely because of increased air-conditioner operation.

ODI evaluated three complaints in which a surge event was alleged to have resulted in injuries to a pedestrian:

1) A woman who sustained minor bruising to her knees in a residential driveway (ODI 10347244). No medical treatment was required and the complainant subsequently stated that the bruising was not serious enough to claim injury; 2) A complaint alleging a surge event while a passenger was exiting the vehicle, resulting in an ankle sprain (ODI 10406215); and 3) A complaint alleging a surge incident resulted in injuries to a woman's knees inside a home garage (ODI 10458725). However, ODI was not able to confirm this incident was related to the alleged defect since the driver was an unlicensed minor.

VRTC Testing. NHTSA's Vehicle Research and Test Center (VRTC) conducted field investigations to interview incident owners/drivers and reproduce idle flare events in complaint vehicles in the same locations as the reported incidents, collected throttle bodies with deposit build up from over 50 complaint vehicles and conducted testing of engine surge events in three Ford Freestyle complaint vehicles (ODI 10401177, 10401362 and 10418753) using the original throttle bodies and several of the other throttle bodies exhibiting the most severe build-up of deposits (see Figure 1). Table 1 summarizes the incident vehicles that were inspected and driven by VRTC test engineers, including the three that were used for engine surge testing.

VOQ	10401177	10401362	10368192	10412316	10418753	10461059
Make	Ford	Ford	Ford	Ford	Ford	Ford
Model	Freestyle	Freestyle	Freestyle	Freestyle	Freestyle	Freestyle
Model Year	2005	2005	2006	2005	2007	2006
Transmission	CVT	CVT	CVT	CVT	CVT	CVT
Surge reproduced	Yes	Yes	Yes	Yes	Yes	Yes
Throttle collected	Yes	Yes	No	No	Yes	Yes

Table 1. VRTC field investigation vehicles/VOQs.

VRTC measured engine speeds, vehicle speeds and vehicle accelerations in 564 idle flare events in the Ford Freestyle test vehicles in a variety of low speed driving maneuvers in forward and reverse gears. The testing determined that approximately 6 pounds of brake pedal force is required to hold a vehicle stationary at normal idle speed (approximately 700 RPM) and approximately 10 pounds will hold a vehicle stationary during the most severe idle flare events.

The maximum engine speeds recorded for each incident range from 840 to 1,495 RPM, with a median value of 1,228 RPM (Figure 2). Slightly more than one third (35 percent) of the peak accelerations recorded for the surge events were greater than 0.1 g and only 1 exceeded 0.2 g (Figure 3). The maximum vehicle speeds resulting from the surge events were as high as approximately 5 mph, with most incidents reaching peak speeds of less than 3 mph (Figure 4).

The durations of surge events exceeding acceleration thresholds of 0.05, 0.10, 0.15 and 0.20 g's are shown in Figures 5 through 8. Less than 10 percent of the surge events recorded by VRTC involved peak accelerations greater than 0.15 g's and most of these exceeded that acceleration threshold for less than 0.4 seconds. The maximum duration for acceleration above 0.15 g's was 0.7 seconds. One surge event exceeded 0.2 g's, but for less than a tenth of a second (0.03 s).

Subjective evaluations of the surge events in Drive and Reverse gears noted that the events were typically triggered by steering input during low-speed turning. The engine speed changes were noticeable, but brief and easily controlled by normal braking efforts.

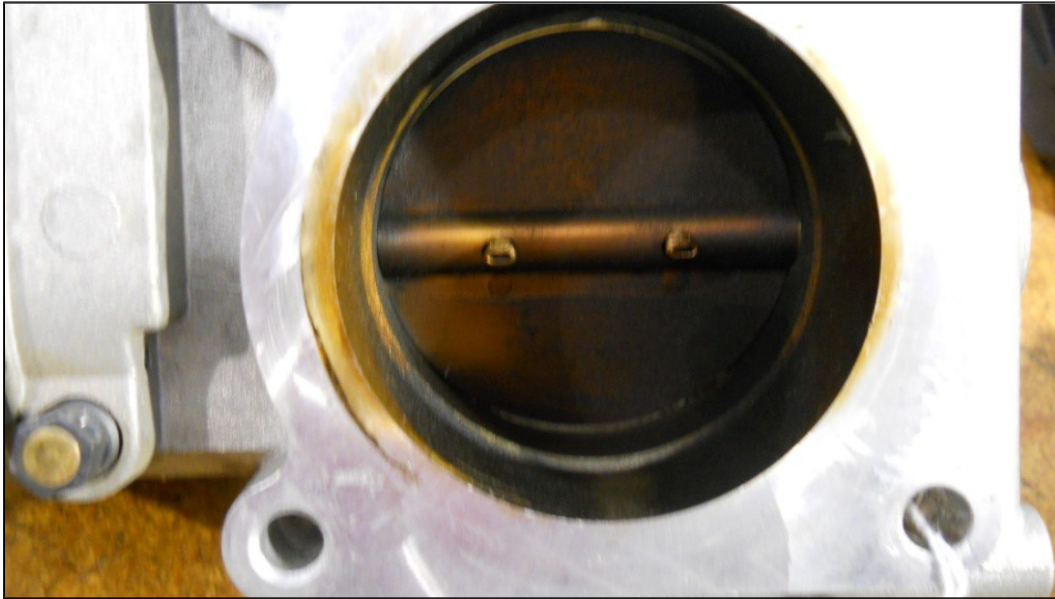


Figure 1. Throttle body bore exhibiting build-up of deposits, 2005 Ford Freestyle.

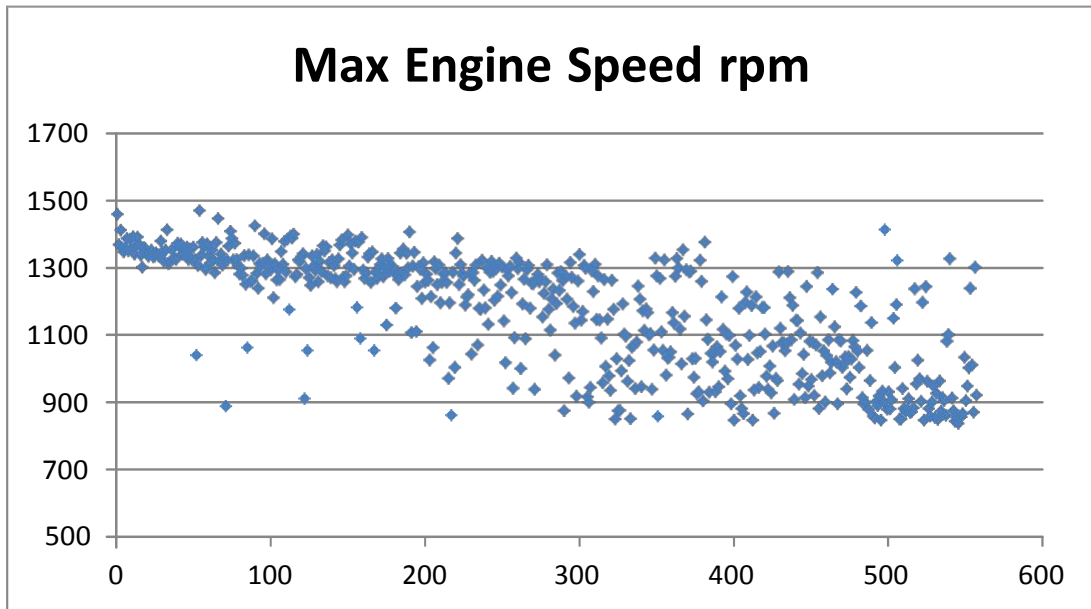


Figure 2. Maximum engine speeds measured in idle flare events (564), VRTC testing of Ford Freestyle vehicles with CVT transmissions.

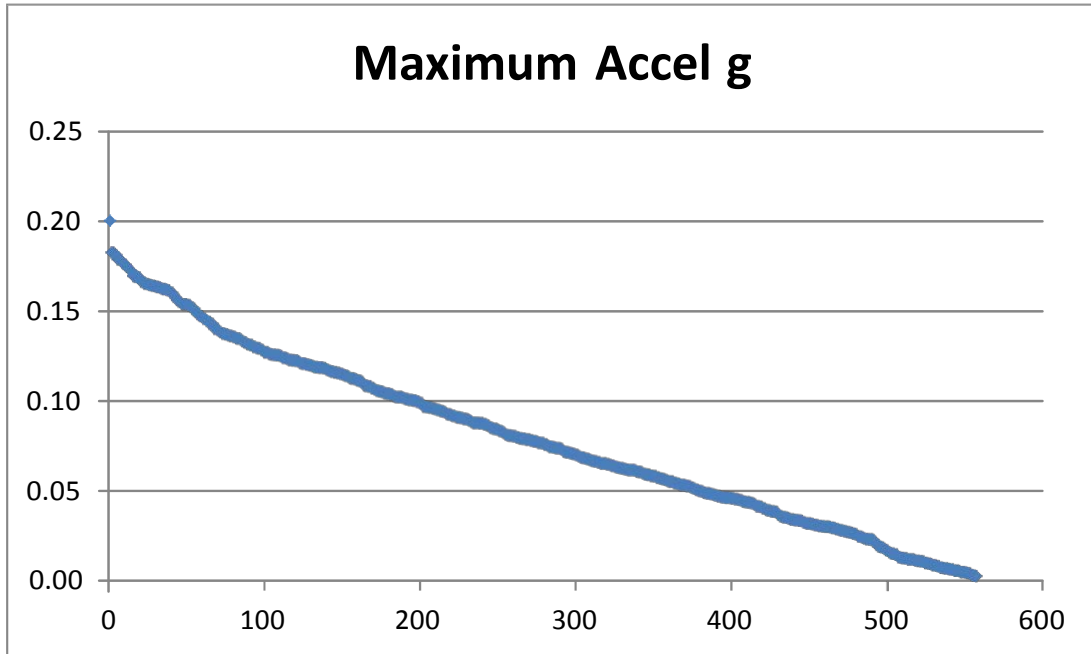


Figure 3. Maximum vehicle accelerations measured in idle flare events (564), VRTC testing of Ford Freestyle with CVT transmissions.

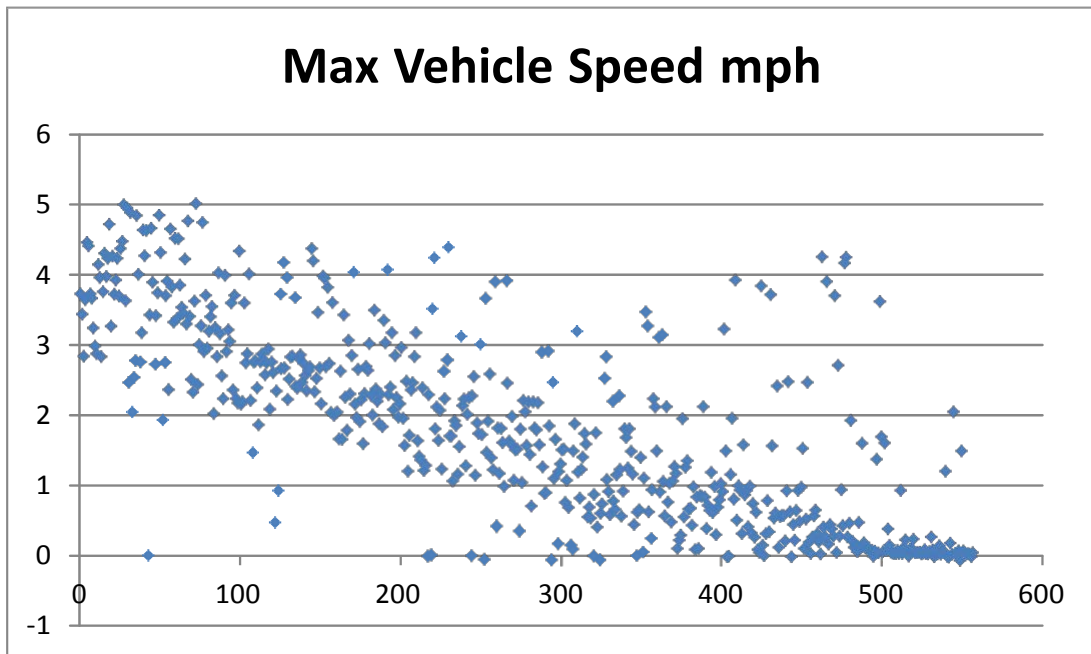


Figure 4. Maximum vehicle speeds measured in idle flare events (564), VRTC testing of Ford Freestyle vehicles with CVT transmissions.

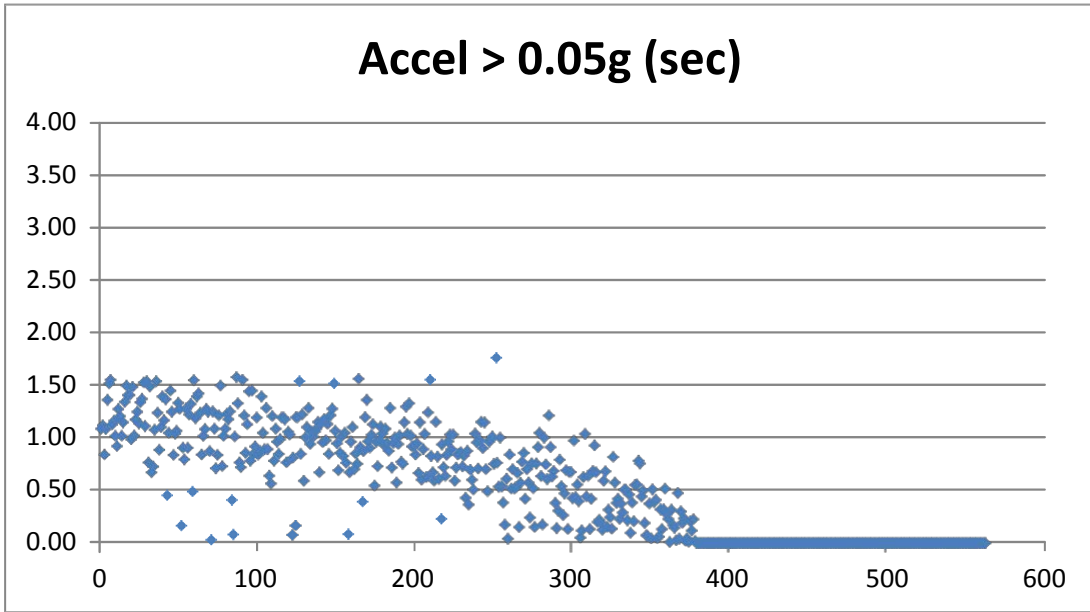


Figure 1. Duration in seconds of vehicle acceleration pulses exceeding 0.05 g (379), VRTC testing of Ford Freestyle vehicles with CVT transmissions.

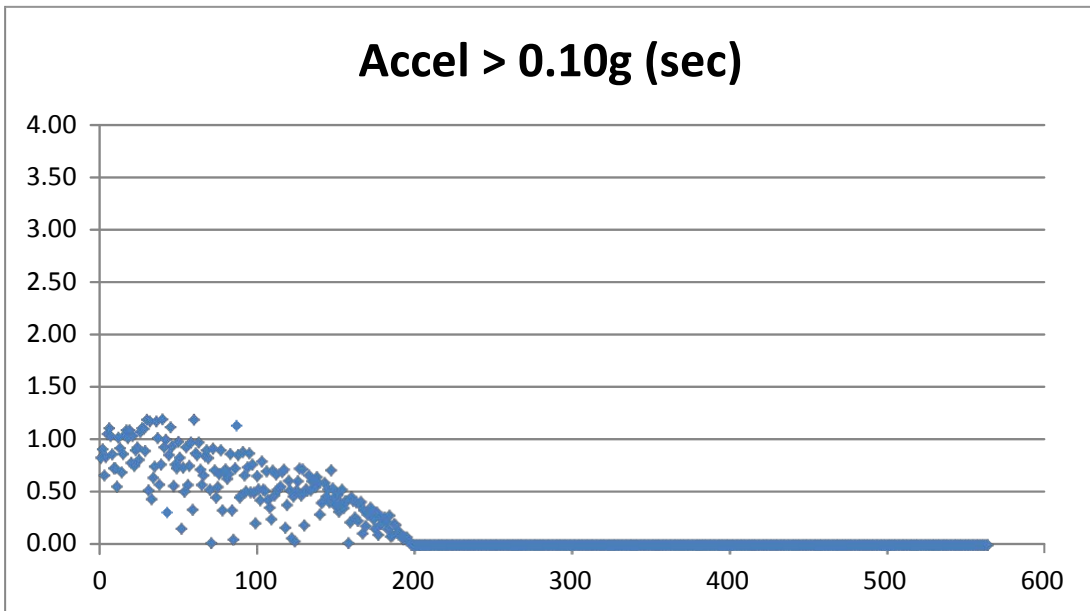


Figure 6. Duration in seconds of vehicle acceleration pulses exceeding 0.10 g (197), VRTC testing of 2005 Ford Freestyle with CVT transmission.

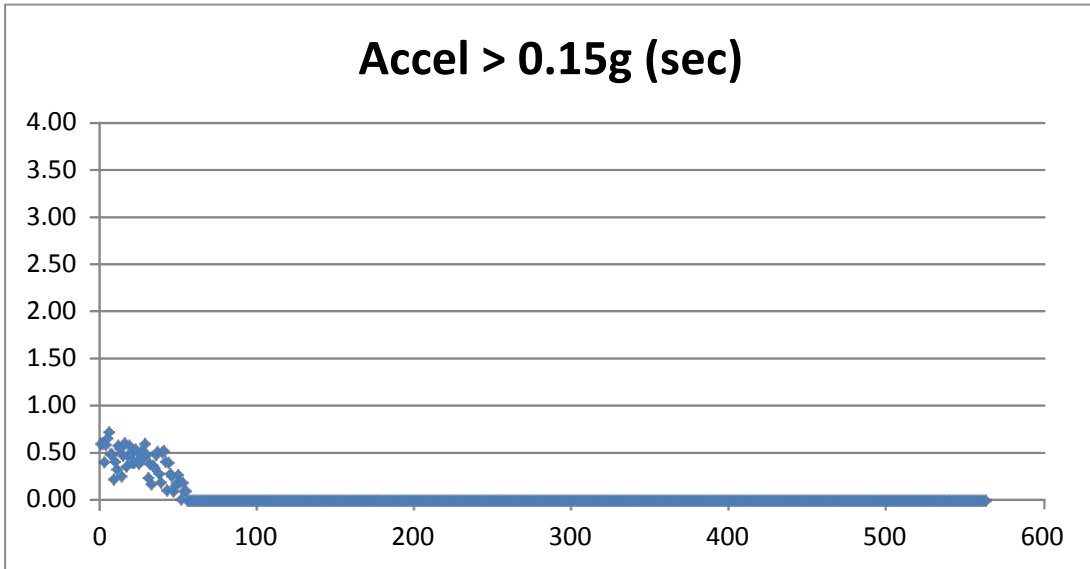


Figure 7. Duration in seconds of vehicle acceleration pulses exceeding 0.15 g (55), VRTC testing of Ford Freestyle vehicles with CVT transmissions.

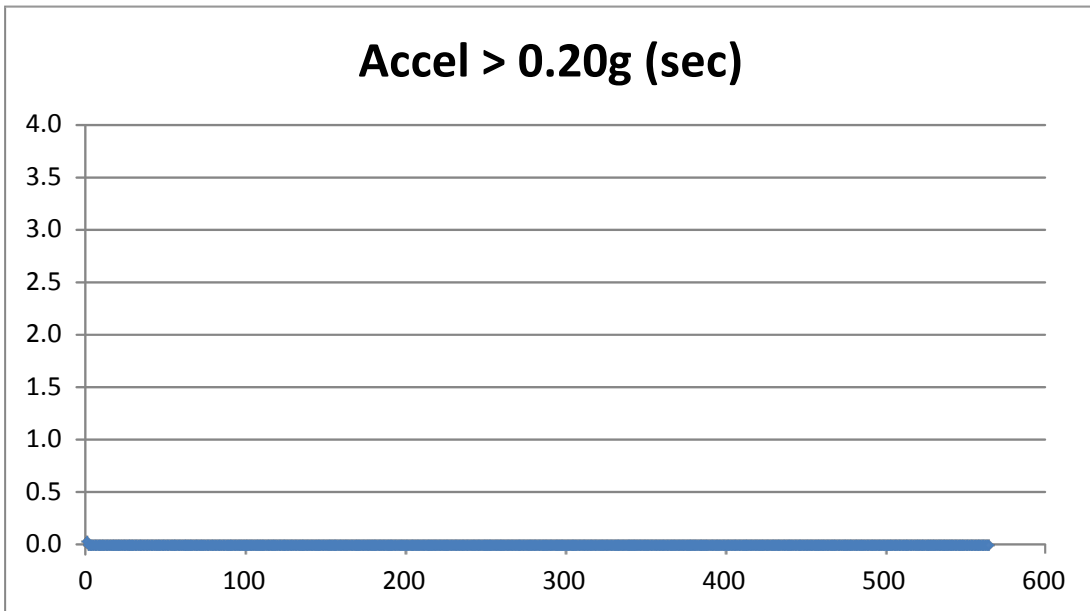


Figure 8. Duration in seconds of vehicle acceleration pulses exceeding 0.20 g (1), VRTC testing of Ford Freestyle vehicles with CVT transmissions.

The VOQs associated with the closing of this investigation are: 10465042, 10352477, 10414568, 10415881, 10454854, 10475516, 10350369, 10442196, 10401177, 10417016, 10365670, 10466323, 10417430, 10423349, 10403713, 10281200, 10411519, 10358499, 10401269, 10421578, 10427525, 10442754, 10401043, 10413612, 10404172, 10238810, 10416546, 10402278, 10421611, 10413627, 10466541, 10410514, 10415074, 10355941, 10424759, 10291547, 10345968, 10346326, 10401050, 10402002, 10469482, 10412095, 10484876, 10351917, 10411872, 10347223, 10414748, 10432201, 10403537, 10414900, 10417069, 10401993, 10407235, 10413407, 10413928, 10365792, 10417956, 10411449, 10416728, 10407297, 10351099, 10401033, 10415811, 10412159, 10471644, 10479469, 10406508, 10348850, 10416772, 10417048, 10427658, 10402579, 10416254, 10408679, 10466930, 10423132, 10411505, 10417708, 10407625, 10417786, 10411879, 10418349, 10354990, 10422696, 10408462, 10429307, 10409428, 10417348, 10384132, 10349907, 10351049, 10412207, 10415491, 10451348, 10418753, 10419692, 10416708, 10468974, 10419996, 10454367, 10457833, 10414920, 10418024, 10463099, 10414596, 10478830, 10430077, 10415244, 10470203, 10401442, 10426749, 10393999, 10417897, 10417272, 10401002, 10405364, 10456699, 10348946, 10402179, 10404126, 10463335, 10416994, 10466884, 10466766, 10352461, 10464146, 10416958, 10460151, 10415105, 10424456, 10401029, 10470233, 10401130, 10437498, 10467843, 10408994, 10471628, 10409011, 10403657, 10415119, 10437754, 10416739, 10279504, 10351705, 10403349, 10426524, 10345819, 10404608, 10401053, 10401014, 10401355, 10468985, 10348427, 10462596, 10350530, 10401887, 10467649, 10467525, 10401365, 10413600, 10351168, 10480740, 10410334, 10473161, 10285984, 10408584, 10483183, 10402217, 10407279, 10414897, 10476560, 10403251, 10415421, 10280342, 10415383, 10479215, 10401086, 10341847, 10460043, 10411768, 10413070, 10402305, 10413265, 10351246, 10407564, 10349348, 10346395, 10425351, 10349676, 10423288, 10467738, 10416424, 10423265, 10462818, 10470726, 10426406, 10351664, 10407021, 10463998, 10381263, 10408720, 10351641, 10419782, 10450128, 10403735, 10408109, 10410149, 10416745, 10419540, 10409391, 10416230, 10408261, 10404105, 10406155, 10410269, 10405108, 10418688, 10467985, 10417122, 10403793, 10406080, 10401299, 10412243, 10473621, 10467974, 10402437, 10463035, 10419917, 10422188, 10334255, 10464540, 10409119, 10411995, 10466269, 10411972, 10403784, 10419994, 10413578, 10419092, 10426300, 10405713, 10410670, 10401174, 10416352, 10464324, 10412367, 10411607, 10462941, 10424075, 10417877, 10417228, 10348945, 10350208, 10401162, 10404055, 10414630, 10481208, 10486644, 10472015, 10410643, 10425850, 10429199, 10417277, 10417412, 10411594, 10403979, 10441426, 10415524, 10459837, 10381353, 10349799, 10274813, 10417803, 10459214, 10406002, 10465291, 10412041, 10410166, 10422556, 10465296, 10351391, 10346416, 10462193, 10474576, 10407097, 10405961, 10415471, 10429567, 10463080, 10458928, 10356800, 10405779, 10445939, 10415347, 10472656, 10419324, 10405831, 10437511, 10418569, 10401012, 10424734, 10406675, 10402368, 10349287, 10418070, 10410571, 10409528, 10415397, 10445427, 10402685, 10358507, 10403700, 10355151, 10420965, 10464734, 10467981, 10351885, 10346771, 10465346, 10362662, 10351302, 10465742, 10341804, 10345942, 10241265, 10413249, 10346900, 10483227, 10423464, 10408088, 10464161, 10412122, 10473293, 10411565, 10347309, 10412420, 10413195, 10444731, 10398247, 10410464, 10423215, 10401289, 10386642, 10421511, 10418603, 10401160, 10412272, 10401221, 10412209, 10406377, 10465134, 10412226, 10401896, 10464373, 10464099, 10416421, 10421435, 10434922, 10347091, 10468187, 10348507, 10469333, 10423249, 10437901, 10415499, 10401337, 10463338, 10409115, 10480787, 10401312, 10461409, 10405536, 10401076, 10486400, 10417230, 10354536, 10410092, 10411148, 10401061, 10349389, 10480057, 10447881, 10416348, 10463141, 10422324, 10278160, 10345812, 10349664, 10403275, 10409233, 10426795, 10462648, 10451691, 10351524, 10406991, 10353122, 10403790, 10406031, 10412728, 10422833, 10411895, 10470111, 10417715, 10411900, 10415529, 10351743, 10370193, 10463177,

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