



**EVENT DATA
FACTUAL REPORT**

**MIAMI, OKLAHOMA
HWY-09-MH-015**

1 of 16



**National Transportation Safety Board
Office of Highway Safety
Washington, DC 20594**

EVENT DATA GROUP CHAIRMAN'S FACTUAL REPORT

A. ACCIDENT

Location: Interstate 44 (I-44) East, Will Rogers Turnpike, at Milepost 321.5, in Ottawa County, Oklahoma, approximately 8 miles northeast of Miami, Oklahoma

Vehicle #1: 2008 Volvo Truck Tractor and 2009 Great Dane Refrigerated Semi-Trailer Combination Unit

Motor Carrier: Associated Wholesale Grocers Inc. of Springfield, Missouri

VEHICLE 2: 2003 Land Rover SUV

VEHICLE 3: 2003 Hyundai Sonata Passenger Car

VEHICLE 4: 2004 Kia Spectra Passenger Car

VEHICLE 5: 2000 Ford Windstar Minivan

VEHICLE 6: 2004 Ford F350 Pickup Truck and 16-foot Livestock Trailer

VEHICLE 7: 2008 Chevrolet Tahoe SUV

Fatalities: 10

Injuries: 5

Date and Time: June 26, 2009, 1:16 p.m. CDT

NTSB#: HWY-09-MH-015

B. EVENT DATA RECORDER GROUP

Christopher C. Voeglie	Senior Investigator	Group Chairman
National Transportation Safety Board	Office of Highway Safety	(404) 562-1658

C. ACCIDENT SUMMARY

About 1:13 p.m. CDT on Friday June 26, 2009 an 18-year-old driver operating a 2001 Ford Focus passenger car eastbound on I-44 Will Rogers Turnpike near milepost 321.76 drifted into a parked truck tractor semi-trailer on the right-hand shoulder. After the Ford side-swiped the semi-trailer wheels the driver overcorrected, lost control and struck the concrete median barrier twice, before coming to rest in the roadway and blocking the dual eastbound lanes. Traffic began stopping and a queue developed before passing motorists could push the disabled vehicle to the right-hand shoulder. The queue of stopped and slowing vehicles extended back approximately 1500 feet to milepost 321.5.

About one-third mile west of the traffic queue, an eastbound 2008 Volvo truck tractor and a 2009 Great Dane refrigerated semi-trailer (combination unit) driven by a 76-year-old truck driver crested a hill on the left lane as it passed a slower moving combination unit. The operator of the slower moving combination unit stated that as both vehicles crested the hill he observed, ahead of him, traffic congestion and brake lights in both lanes and began to slow. The witness also stated that after the accident truck passed him, it changed back to the right lane, never slowed or applied its' brakes, and crashed into the stopped traffic ahead. Additional witness statements estimated the speed of the accident truck at about 70 mph in the posted 75 mph zone, and indicated that brakes were not applied before the accident truck collided with the rear of the traffic queue. This accident occurred at 1:16 p.m. CDT, three minutes after the first accident.

At initial impact, the combination unit struck a 2003 Land Rover SUV, pushing it forward into a 2003 Hyundai Sonata passenger car; the Land Rover continued off to the right where it came to rest on the right-hand grassy right-of-way. The combination unit continued forward approximately 42 feet and collided into the Hyundai, overriding it and pushing it forward about 29 feet to where the combination unit then struck and overrode a 2004 Kia Spectra passenger car. The combination unit and the two passenger vehicle continued forward into the rear of a 2000 Ford Windstar minivan, which was also partially overridden by the combination unit. The Ford minivan was pushed forward into the rear of a 16-foot livestock trailer (loaded with 10 head of sheep) being towed by a 2004 F350 pickup truck. The F350 pickup truck was then pushed forward into a 2008 Chevrolet Tahoe. The combination unit came to final rest on top of the Hyundai, Kia, and a portion of the Ford minivan. From the initial impact to final rest, the combination unit traveled approximately 270 feet, leaving gouges and friction tire marks on the pavement.

At the time of the accident the weather was clear and the pavement was dry.

As a result of the collision, 10 occupants in the passenger vehicles were fatally injured; nine passengers were fatally injured at the crash site and one passenger died at an area hospital and five passengers received minor to serious injuries. The driver of the combination unit received serious injuries. Four of the passenger cars were destroyed from impact. The Ford F350, livestock trailer, and Chevy Tahoe had moderate damage. The Volvo truck tractor sustained extensive damage, and the Great Dane trailer was undamaged.

D. DETAILS OF INVESTIGATION

This portion of the Safety Board's investigation was initiated in an effort to determine whether any digital or analog data existed within or upon the 2008 Volvo truck-tractor (tractor) that could assist in the Safety Board's investigation and analysis of this accident. This report will discuss data recovered from the following sources: the engine's electronic control module, a CADEC on-board computer (OBC) and the airbag control module (ACM).

1. 2008 VOLVO TRUCK TRACTOR

1.1 ELECTRONIC CONTROL MODULE

The 2008 Volvo truck tractor (tractor) was equipped with a Cummins ISX, electronically controlled diesel engine. Because the engine was electronically controlled, it was equipped with an electronic control module (ECM).

An ECM as referenced within this report, is a semiconductor unit for controlling ignition timing, fuel delivery, speed control and other parameters in an engine management system. It is the primary computer responsible for processing signals produced by engine and vehicle sensors and for activating automated engine components, systems and processes in order to produce optimum performance and efficiency.

Many late model Cummins ECMs have the ability to capture and preserve operating data related to predefined events. These events are typically triggered or recognized by the calculated deceleration rate of the vehicle or through a dedicated signal from a sensor on the engine or a combination of events or signals.

Although the subject ECM was not designed or intended to function as a “crash” event data recorder (EDR), the subject ECM was capable of recording various operating parameters in connection with critical diagnostic events, as well as sudden deceleration events. Because the ECM was not designed or intended to function as an EDR, it lacks the parameters and precision of these devices. Nonetheless, the ECM did provide the Safety Board with viable data associated with the operation of the tractor.

1.2 ECM DATA

According to investigating law enforcement, the accident occurred at approximately 1:16 p.m., CDT on June 26, 2009. The tractor was subsequently secured by the Oklahoma State Highway Patrol as part of its accident investigation.

The ECM was transferred into the custody of the undersigned Group Chairman via FedEx air bill number 869267758255 for data interrogation and analysis. The subject ECM was received by the undersigned at 10:31 a.m. on July 2, 2009.

On July 2, 2009, the ECM was removed from its packing materials for inspection. The unit presented to be in good overall physical condition with no indication of damage. However, because an appropriate harness was not available for this ECM configuration, the ECM was transported to the Cummins Engine Corporation facility located in Columbus, Indiana for data imaging.

1.2.1 ECM DATA IMAGING

In order to communicate with and image data from the ECM, proprietary software tools were utilized. PC computer based software “Cummins Insite” (Insite) was used to access and communicate with the subject ECM. Insite is utilized to view and image available data such as stored diagnostic fault codes, engine calibrations, ECM calibrations, and specific reports on driver and trip information.

On July 8, 2009, at approximately 10:47 a.m. local time, the subject ECM was connected to a continuous power supply, an ECM test harness configured to best reduce the chance of creating any new fault data, and to a laptop PC computer equipped with Insite v7.2, PC ID number 47DFA676.

A Cummins "Inline 5" datalink adapter¹ was utilized to facilitate communication between the J1939 CAN² interface of the ECM and the serial interface of the PC. Once communication with the ECM was established a Job Image was created. The total ECM Time was 3160:26:21 (HH:MM:SS) at the time the Insite job image was created.

The job image data that was created was named "NTSB ECM.eif". In addition, this data file was saved in an additional format using the file name of "NTSB ECM.csv". Both files contain the same information and differ only by the data storage format used. It was also noted that two faults were reported as active upon powering the ECM.

Subsequent to the imaging and preservation of the Insite job image data, a second software tool was utilized to image additional data records from the ECM. This second software tool, known as "PowerSpec" is most commonly used in the field to access data from the ECM such as Calibration Data; Spec Plate Information, Fault Information, Feature Settings, Sudden Deceleration Data (SDD) and Trip Information. Powerspec version 4.1.2.1 was used, and the following data files were imaged and preserved:

"NTSB ECM-Data Plate.htm"

"NTSB ECM-Fault.htm"

"NTSB ECM-FeatureSetting.htm"

"NTSB ECM-SuddenDecel.htm"

"NTSB ECM-Trip.htm"

The final step of the data imaging process was to utilize a Cummins proprietary software engineering tool, referred to as Calterm III. This software tool was utilized to access and image the raw data specific to the ECMs Sudden Deceleration log. This data in particular is stored in memory locations within the ECM which are not accessible with the Insite or PowerSpec tools. These memory locations hold the raw data as logged when a sudden deceleration event occurs. These data were then placed in Microsoft Excel to be decoded into meaningful data for further analysis.

1.3 ECM CONFIGURATION

Examination of the ECM data indicated the subject ECM was a model ISX CM871, serial number 5003689, which was configured for use with a 2007 EPA engine bearing serial number 79280430 and within vehicle identification number 4V4NC2M93JMDA87W064449.

This ECM configuration data was determined to correlate with the accident tractor.

¹ A serial data translation device is used to connect PC's or PDA's to a heavy duty vehicle data bus and converts J1708, J1939, CAN, and SO 9141 communications to RS0232 serial data.

² Controller area network

1.3.1 CRUISE CONTROL

The ECM was configured for the use of traditional cruise control features such as “set”, “coast”, “resume” and “accelerate” with a maximum speed of 70 mph. The “adaptive cruise”, “auto-resume” and “save set speed” features were disabled and thus not available for use by the driver.

1.3.2 ROAD SPEED GOVERNING

The subject ECM’s Road Speed Governor (RSG) controls were “enabled” and configured with a maximum road speed of 70 mph.

1.3.3 ECM TIME

The subject ECM did not support a real-time clock function. However, the ECM did possess two time keeping parameters; an “ECM Time”, which provides a cumulative time of ECM operation (“key-on”), and “Engine Time”, which provides a cumulative time of engine operating time.

Data imaging occurred at ECM time 3160:26:21 hours with an ECM odometer of 145,587.0 miles, and an engine time of 3060:40:30 hours with an engine odometer of 145,566.2 miles.

1.3.4 DRIVE-TRAIN CONFIGURATION

The ECM was configured for use with a manual transmission with a top gear ratio of 1.00:1, and a top gear down ratio of 1.34:1. The vehicle speed source data was configured for sensor output from a 16-tooth transmission tail shaft sensor, with a rear axle ratio of 2.64, and with the use of 511 revolutions per mile size tires.

1.4 DIAGNOSTIC DATA

Examination of the available data revealed five (5) “In-active”, and two (2) “Active” diagnostic fault codes. An “active” fault code represents a condition, which is currently occurring, in contrast to an “in-active” fault code, which represents an event(s), which have occurred in the past and are no longer occurring, and have not yet been removed from memory.

1.4.1 ACTIVE DIAGNOSTIC CODES

At the time of ECM data imaging there were two (2) active fault codes reported by the ECM. These fault codes were later identified as “Exhaust Gas Recirculation Valve Delta Pressure – Data Erratic, Intermittent or Incorrect” and “SAE J1939 Multiplexing PGN Timeout Error – Abnormal Update Rate”.

- The data regarding the **“Exhaust Gas Recirculation Valve Delta Pressure”** indicated that this condition had been active since ECM Time 2958:58:35 hours.

- The data regarding the “**SAE J1939 Multiplexing PGN Timeout Error – Abnormal Update Rate**” indicated this condition had only been reported on one (1) occasion and was reported active at ECM time 3160:25:33.

1.4.2 INACTIVE DIAGNOSTIC CODES

There were also five (5) Inactive diagnostic fault codes reported by the ECM. These codes were later identified as “**Power Supply Lost with Ignition On**”, “**After-treatment Exhaust Gas Temperature**”, “**After-treatment Fuel Injector**”, “**Catalyst Face Plugged**” and “**Wheel-Based Vehicle Speed**” diagnostic events.

Because these fault codes were “in-active”, these conditions were not occurring at the time of data imaging, but rather represent conditions that existed at some point in time prior to the time of data imaging. Examination of the data revealed that with the exception of the “Power Loss” and “Wheel Speed” faults, each of the fault conditions were reported to have occurred on multiple occasions.

- “**Power Supply Lost with Ignition On**” – This type of fault event occurs when voltage to the ECM falls below 6.2 volts, or when the ECM was not allowed to power down correctly. Unfortunately, due to the very nature of this type of condition, the ECM cannot record any data in connection with this type of occurrence.
- “**Wheel-Based Vehicle Speed**” - Data captured in connection with this event indicated that the data was erratic, intermittent or incorrect. This condition is reported when there is a problem with the signal received by the ECM from the vehicle speed sensor; or when the ECM loses the vehicle speed signal. This condition was reported at ECM hours 3160:25:36.
- “**After-treatment Exhaust Gas Temperature**” - Data regarding this event indicated that the data was valid, however, it was above the normal operating range, and was reported at the “moderately severe level”. This condition was reported as occurring on two (2) separate occasions; however no fault snapshot data was available.
- “**After-treatment Fuel Injector**” - The data regarding this event indicated that the data was valid, however, above the normal operating range and was reported at the “moderately severe level”. This condition was reported as occurring on four (4) occasions. The first and last events were reported to have occurred at ECM time 2792:33:02.
- “**Catalyst Face Plugged**” - The data regarding this event indicated that it had been reported active on five (5) occasions. There were no snap-shot data available for this event. This fault condition is reported when the front face of the after-treatment diesel oxidation catalyst has been detected to be plugged with soot.

1.5 AUDIT TRAIL

Audit trail data documents any changes made to the ECM's programming. The data contains the type of change made, the engine hours at the time of the change, the service tool utilized to make the change(s) and the tool operator's ID.

Available data indicated that a total of four (4) separate ECM configuration changes were conducted by two (2) different user IDs. All four entries were identified as being made with an INSITE tool.

The following reported actions are listed in chronological order as indicated by the ECM clock.

- At ECM time 1120:09:51 hours, user ID "00002BC5A5D1" utilizing tool ID "700003432901" made changes to the ECM's "Cruise Control", "Maximum Vehicle Speed without Vehicle Speed Sensor", "Fan Clutch Control", "PTO" and "Low Idle Adjustment" configurations.
- At ECM time 2190:09:40 hours, user ID "000024C72D63" utilizing tool ID "702003622901" made changes to the ECM's Idle Shutdown configuration.
- At ECM time 2604:31:48 hours, user ID "00002BC5A5D1" utilizing tool ID "702003622901" reset the inactive diagnostic fault codes contained within the ECM.
- At ECM time 2713:21:48 hours, user ID "000024C72D63" utilizing tool ID "702003622901" made changes to the ECM's Idle Shutdown configuration and reset the inactive diagnostic fault codes contained within the ECM.

1.6 SUDDEN DECELERATION DATA (SDD)

The ECM was capable of recording select data parameters in connection with sudden deceleration events. A sudden deceleration event is defined as an event in which the vehicle's deceleration exceeds the ECMs event trigger threshold.

The ECM's sudden deceleration event trigger was configured at 9mph/s (miles-per-hour/per-second) and was capable of capturing and storing event reports for the last three (3) SDD events. SDD reports display 60-seconds of pre-trigger data, and 15-seconds of post trigger data.

The subject ECM contained three (3) Sudden Deceleration events. The most recent event was reported as occurring at ECM time 3160:24:55 and with an occurrence mileage reading of 145566.5 miles. (See Graphic which follows)

The two (2) additional events were reported at ECM time 3066:59:30, with an occurrence odometer reading of 141390.2 miles; and at ECM time 3125:35:21, with an occurrence odometer reading of 143954.4 miles.

SDD can include useful information in accident investigations such as Occurrence Date, Total ECM Run Time, Air Temp, Distance (miles), Vehicle Speed (mph), Engine Speed (rpm), Engine Load (%), Throttle (%), Brake Status, Clutch Status, Cruise Status and Diagnostic Lamp Status.

Occurrence Date		N/A		Total ECM Run Time @ Occurrence (H:M:SS)			3160:24:55	
Air Temp @ Occurrence (* F)		99		Occurrence Distance (miles)			145566.5	
Time (Seconds)	Vehicle Speed (mph)	Engine Speed (rpm)	Engine Load (%)	Throttle (%)	Brake Status	Clutch Status	Cruise Status	Lamp Status
-59	70	1566	57.8	0.0	-	-	On	-
-58	70	1565	50.5	0.0	-	-	On	-
-57	70	1566	61.3	0.0	-	-	On	-
-56	70	1563	63.3	0.0	-	-	On	-
-55	70	1568	64.8	0.0	-	-	On	-
-54	70	1570	66.4	0.0	-	-	On	-
-53	70	1568	65.6	0.0	-	-	On	-
-52	70	1567	66.8	0.0	-	-	On	-
-51	70	1565	68.4	0.0	-	-	On	-
-50	70	1563	68.8	0.0	-	-	On	-
-49	70	1568	69.1	0.0	-	-	On	-
-48	70	1567	70.7	0.0	-	-	On	-
-47	70	1572	70.7	0.0	-	-	On	-
-46	70	1565	71.5	0.0	-	-	On	-
-45	70	1568	72.7	0.0	-	-	On	-
-44	70	1562	71.9	0.0	-	-	On	-
-43	70	1568	73.0	0.0	-	-	On	-
-42	70	1574	73.8	0.0	-	-	On	-
-41	70	1569	72.7	0.0	-	-	On	-
-40	70	1568	74.2	0.0	-	-	On	-
-39	70	1566	72.7	0.0	-	-	On	-
-38	70	1568	73.8	0.0	-	-	On	-
-37	70	1559	73.0	0.0	-	-	On	-
-36	70	1568	73.0	0.0	-	-	On	-
-35	70	1571	72.3	0.0	-	-	On	-
-34	70	1576	71.5	0.0	-	-	On	-
-33	70	1569	71.5	0.0	-	-	On	-
-32	70	1567	70.3	0.0	-	-	On	-
-31	70	1575	69.6	0.0	-	-	On	-
-30	70	1568	69.5	0.0	-	-	On	-
-29	70	1575	69.1	0.0	-	-	On	-
-28	70	1574	68.4	0.0	-	-	On	-
-27	70	1572	67.2	0.0	-	-	On	-
-26	70	1570	66.0	0.0	-	-	On	-
-25	70	1671	66.0	0.0	-	-	On	-
-24	70	1570	65.2	0.0	-	-	On	-
-23	70	1571	63.7	0.0	-	-	On	-
-22	70	1569	62.5	0.0	-	-	On	-
-21	70	1578	62.8	0.0	-	-	On	-
-20	70	1573	61.7	0.0	-	-	On	-
-19	70	1578	61.7	0.0	-	-	On	-
-18	70	1576	61.3	0.0	-	-	On	-
-17	70	1569	60.5	0.0	-	-	On	-
-16	70	1574	60.9	0.0	-	-	On	-
-15	70	1570	60.5	0.0	-	-	On	-
-14	70	1573	61.3	0.0	-	-	On	-
-13	70	1579	63.7	0.0	-	-	On	-
-12	70	1572	62.1	0.0	-	-	On	-
-11	70	1581	62.9	0.0	-	-	On	-
-10	70	1440	58.6	0.0	-	On	-	-
-9	67	1430	0.0	0.0	-	-	-	-
-8	65	1319	0.0	0.0	-	-	-	-
-7	63	1365	0.0	0.0	-	-	-	-
-6	61	982	0.0	0.0	-	-	-	-
-5	54	653	39.5	0.0	-	-	-	-
-4	43	517	66.8	30.8	-	-	-	-
-3	33	617	61.7	0.0	-	-	-	-
-2	27	000	0.0	0.0	-	-	-	-
-1	24	644	11.7	0.0	-	-	-	-
0	22	572	48.8	0.0	-	-	-	-
1	20	343	67.0	0.0	-	-	-	-
2	18	419	0.0	0.0	-	-	-	-
3	16	380	0.0	0.0	-	-	-	-
4	16	441	0.0	0.0	-	-	-	-
5	15	383	0.0	0.0	-	-	-	-
6	14	420	0.0	0.0	-	-	-	-
7	14	370	0.0	0.0	-	-	-	-
8	14	405	0.0	0.0	-	-	-	-
9	13	378	0.0	0.0	-	-	-	-
10	13	381	0.0	0.0	-	-	-	-
11	13	192	0.0	0.0	-	-	-	-
12	11	147	0.0	0.0	-	-	-	-
13	9	0	0.0	0.0	-	-	-	-
14	8	174	0.0	0.0	-	-	-	-
15	5	162	0.0	0.0	-	-	-	-

1.6.1 KNOWN DATA LIMITATIONS

- There is a potential calibration error regarding the sampling rate of SDD, which affects many EPA07 Cummins ECMs. Specific to ISX engines manufactured after January 2, 2007 and before September 25, 2008, calibration errors result in

the SDD sampling rate to be reported at the expected 1 Hz; when in fact the actual sampling rate occurred at 5 Hz.

- The subject ECM's software does not support a real-time clock, however, the subject calibration software erroneously included a "ECM Real Time" value of "1193:02:47" within some diagnostic snap-shot reports. This time value when properly scaled, calculates to a hexadecimal value of FFFFFFFF (4 bytes of all 1's). This hex value of FFFFFFFF indicates a default time. This memory block value is expected given that a real time clock feature was not supported, and there are no means for it to be programmed. This issue was subsequently corrected within updated calibrations.

1.7 ON-BOARD COMPUTER (OBC)

1.7.1 GENERAL INFORMATION

In addition to the previous data, additional data was found available from the tractor's On-Board Computer (OBC) system known as a Cadec Mobius TTS OBC. The Mobius TTS system was manufactured by the former Cadec Corporation, of Londonderry, New Hampshire, now known as Cadec Global Inc., of Manchester, NH.

The Mobius TTS system is designed and marketed as a fleet management system providing companies with data analysis and reporting capabilities intended to optimize mobile resources, improve driver performance and meet DOT HOS compliance and safety requirements.

The Mobius TTS system integrates the use of onboard computing, a driver display/interface terminal, GPS technology, and wireless communications with a client based database server, and a shared GUI³ based software application. The primary component within the Mobius system is the vehicle mounted OBC, or driver's display terminal. The principal operation of the Mobius system can be broken down into separate processes.

The OBC unit monitors and collects data obtained from the driver, the vehicle CANbus, and integral GPS receiver. This data is processed, recorded and ultimately transmitted to a database server, or stored within the OBC unit until transmitted.

The amount and type of stored data will vary depending on the configuration of the system and the needs of the end user. The collected data are transmitted via several wireless methods including cellular, satellite, CDPD⁴ or short range RF to the carrier's database server where the data are archived and available for analysis utilizing the Mobius TTS "Office" software application. This data, once received by the server is available to the end user allowing the end user to access the data at any time as well as the ability to determine where each fleet vehicle is located and the status of each operator.

The Mobius system is available with numerous optional features in order to suit the specific needs of each end user. However, all Mobius OBCs are equipped with a 12-channel GPS receiver which is used to produce detailed records of the vehicle's operation, including accident reports, sudden decelerations, unknown stops and complete trip recordings.

³ Graphic User Interface

⁴ cellular digital packet data

1.7.2 OBC EXAMINATION

Although Associated Wholesale Grocers, (AWG) (*the motorcarrier*) provided Safety Board investigators with printed reports/documents for the accident tractor. These documents were generated from AWG's MOBIUS "Office" application.

In order to determine whether or not all of the OBC's raw data had been successfully transmitted, the OBC unit was removed from the accident tractor and transferred to the undersigned investigator.

The OBC was transferred into the custody of the undersigned Group Chairman via FedEx air bill number 869267758255 for data interrogation and analysis. The subject ECM was received by the undersigned at 10:31 a.m. on July 2, 2009.

On July 2, 2009, the OBC was removed from its packing materials for inspection. The unit presented to be in good overall physical condition and displayed the following indentifying information:

85-9004-R00
REV 7
S/N 1016188

The serial number identified the OBC as a version 7," Mobius TTS Compact OBC." The OBC was equipped with the following ports, connectors and components:

MS Windows CE – Operating System
(1) Intel Strong ARM 32 bit RISC CPU
12-Channel GPS Receiver
64MB RAM
32MB Flash
(4) RJ45 connectors - SW OUT, SW IN, COM1 and GPS
(1) 15-pin D connector – Pwr/J1587/J1939
(4) USB connectors
(1) PCMCIA Slot-
(1) CompactFlash Slot -
(2) Internal Speakers
(1) Microphone input jack
(1) Speaker output jack

Due to the need for an additional hardware component required for imaging the OBC data, examination of the OBC was delayed until November 21, 2009. On November 21, 2009, at approximately 4:13 p.m. EST, the subject OBC was connected to a proprietary CADEC power and communication harness configured for the subject OBC. Upon supplying power to the OBC, the unit immediately powered-up and a review of the available records revealed that the OBC contained no data files in connection with any accidents or sudden deceleration events.

1.7.3 OBC CONFIGURATION

Examination of the configuration and calibration data indicated an operating system version of 3.0 and an OBC serial number of 1016188. The following configuration data were transcribed from the OBC's video display:

SYSTEM INFO:

OS Version	= 3.0 (ADS ver 3.22)
ADSLOAD.reg Version	= 3.10
OBC Version	= 3.6.6.1
Serial Number/CMID	= 1016188
OBC IP Address	= 169.254.6.175 <cisco>
Channel 0 Address	= 10.2.200.85
Channel 1 Address	= 12.30.163.119
OBC Key	= 277
Vehicle Key ID	= 193 – 481
Site Key	= 2
UPPS Version	= SP Prompt Set v3.400

SYSTEM CONFIGURATION:

GPS Collection Interval	= .10 Miles
Speed Limit	= 72 MPH
Speed Limit Warning Time	= 15 Seconds
RPM Limit	= 2250 RPM
Idle Warning Time	= 300 Seconds
Departure Distance	= 1.25 Miles
Arrival Time	= 300 Seconds
Deceleration Threshold	= 7.0 MPH/Sec
Unknown Stop Time	= 300 Seconds
Sleep Delay (logged-in)	= 50400 Seconds
Sleep Delay (logged-out)	= 1800 Seconds
Time Zone	= CST
In Daylight Savings Time	= No

ENGINE:

Tach RPM	= 0
Speed MPH	= 0
Current MPG	= 0
Odometer	= 144300.80 miles
Fuel Used	= 3650.3876
Fuel Rate (gph)	= 0
RPM Cal Factor	= 1.0000
Engine Bus Type	= ATA

ATA:

Bytes Received	= 102863891
Sentences Detected	= 5727318
Sentences Dumped	= 40515
Min Gap Time	= 0
Min Valid Gap Time	=10
Max Time w/o Data	= 155358822
Total Comm Errors	= 75
Last Comm Error	= 8
Bytes Used	= 56482287
Max Sentences Per Cycle	= 16
Valid Sentences	= 4711883
Max Sentences Per Sentence	= 14
Leading Bytes Skipped	= 13253873
Sentences w/LBS	= 2489914
Incomplete Sentences	= 1697640

CM:

Ack Queue Len	= 3
Duplicate Events	= 96
Min Track Num	= 30405
Max Track Num	= 30407
Min Seg Num	= 30514
Max Seg Num	= 34825
Ack Bytes	= 398
HH Queue Len	= 0
WLAN Queue Len	= 1
Main Channel Up	= No
Main Channel Busy	= No

DEBUG:

Handheld Present	= No
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ENGINE / VEHICLE:

Speed	= 0
RPM	= 0
MPG	= 0
Odometer	= 144300.79930565

GPS:

Packets	= 0
Errors	= 0
Temp	= 0
Speed	=0
Secs	= 1246066983
Latitude Deg	= 36

GPS cont.:

Latitude Min	= 55
Latitude Seconds	= 406650
Longitude Deg	= -94
Longitude Min	= 43
Longitude Seconds	= 584250
UTC Time	= 6/27/09 1:43:03 AM
Position Valid	= No
North Hemisphere	= Yes
West Hemisphere	= Yes
System Updated	= No
Stored Data OK	= No
Real Time Clock OK	= No
Osc. Drift OK	= No

MEMORY:

Avail ObjStore	= 8501
Total ObjStore	= 10156
Load ObjStore	= 17
Avail Ram	= 32768
Load Ram	= 25
Total Ram	= 43220
Ram Load Level	= 0
ObjStore Load Level	= 0

PERFORMANCE:

CPU Usage	= 13
Average Process Latency	= 1
Last Update Error	= 1
Min Update Error	= 0
Max Update Error	= 3673

POWER:

Power Source	= 1
Battery State	= 128
Battery Life	= 100
BackUp Batt State	= 1
BackUp Batt Life	= 100
Batt Conn ADC	= 0
Backup Battery (x10)	= 0
HW2 Temp (celcius)	= 0
Vehicle Voltage (x100)	= 1241

SWITCHES:

Analog 1	= 0
Analog 2	= 0
Analog 3	= 0
Analog 4	= 0

1.7.4 OBC EVENT DATA

In the absence of any available data from within the OBC, staff examined the printed OBC data provided by AWG. These documents and reports were generated from AWG’s Mobius TTS Database and Office program.

The printed data consisted of the following:⁵

- (1) Sudden Deceleration Report
- (1) Accident Report
- (6) Printed “Screen Captures”

1.7.5 OBC SUDDEN DECELERATION DATA

The Cadec OBC was capable of capturing and recording vehicle speed, engine speed and GPS based Latitude and Longitude data in connection with a sudden deceleration event (SD). A sudden deceleration event is defined by Cadec as an event in which the vehicle’s deceleration rate exceeds that of the OBC’s pre-determined threshold.

The accident OBC unit was capable of recording as many as 10 SD events and was configured with a SD threshold of 7mph/s (miles-per-hour/per-second). SD event data contains 150-seconds of pre-trigger data, as well as 30-seconds of post trigger data.

The reported SD event indicated it occurred at 13:19:18 central time on June 26, 2009.⁶

1.7.6 OBC ACCIDENT DATA

Similar to SD events, the OBC was also capable of recording vehicle speed, engine speed and GPS based Latitude and Longitude data in connection with an accident event. Accident events are designed to be primarily triggered by the driver of the vehicle by pushing the “accident” button on the OBC.

The OBC was capable of recording as many as 10 accident events. Like SD events, each accident event recording consisted of 150-seconds of pre-trigger data as well as 30-seconds of post trigger data.

The reported accident event indicated that it occurred at 13:19:23 central time on June 26, 2009.

⁵ See Attachment B

⁶ OBC time data is derived from the GPS.

1.8 AIR BAG CONTROL MODULE

The tractor was equipped with a supplemental restraint (airbag) system (SRS). Although the presence of an SRS was not noted during post accident vehicle inspections, it was confirmed through vehicle engineering records that the tractor was equipped with a driver side air-bag in conjunction with pyrotechnic pre-tensioners.

The SRS is controlled by an electronic control module and is most commonly referred to as the airbag control module or ACM.

This version of Volvo's heavy vehicle ACM is capable of limited data collection in connection with both detected crash events (airbag deployment), as well as detected "near crash events" (non-deployment).

Currently, Volvo's heavy vehicle ACM data can only be imaged at the Volvo Truck Corporation facility located in Sweden. The current wait time for U.S. based "law enforcement" cases now exceeds 6-8 months.

Apart from the logistics of accessing any potential ACM data, the subject ACM is subject to several technical limitations that must be considered. The subject ACM contains an internal accelerometer which is mounted upon the ACM circuit board. The ACM is mounted within the confines of the tractor's cab, which is equipped with a suspension system independent from the vehicle suspension. This results in the ACM mounted upon a sprung mass (the cab) which is also mounted upon another sprung mass. (the chassis) In addition, acceleration pulse data is only monitored along the vehicle's longitudinal axis and for a maximum of 160ms.

Due to the known data limitations of the subject ACM, the logistics of accessing and analyzing the data combined with the fact that viable event data existed upon the ECM and the OBC, it was determined that additional investigative measures to pursue any potential event data from the ACM was not warranted.

E. ATTACHMENTS

Attachment A – Engine ECM Data

Attachment B – CADEC MOBIUS OBC Data

END OF FACTUAL REPORT

S/ _____ September 11, 2009
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Event Data Recorder Group Chairman