



NISSAN NORTH AMERICA, INC.

One Nissan Way
Franklin, TN 37068
P.O. Box 685001
Franklin, TN 37068-5001

December 23, 2015

Department of Motor Vehicles
Licensing Operations Division
P.O. Box 932345
Sacramento, CA 94232-3450

Attention: Henry Barber

Re: Nissan Autonomous Vehicle Disengagement Report 2015

Dear Mr. Barber:

Enclosed for review and processing is the completed Nissan AV disengagement report up to and including November 30, 2015.

Vehicles Covered in this report:

- Leaf #1 CA License DST 562 43U
- Leaf #2 CA License DST 562 51U
- Q50 #1 CA License DST 562 42V
- Q50 #2 CA License DST 562 39N

Pursuant to California code of Regulations title 13, article 3.7, section 227.46, the annual report summarizes disengagements for each month as follows:

- Total number of autonomous mode disengagements and the circumstances or testing conditions at the time of the disengagement including:
 - The location: interstate, freeway, highway, rural road, street, or parking facility
 - A description of the facts causing the disengagement, including: weather conditions, road surface conditions, construction, emergencies, accidents or collisions, and whether the disengagement was the result of a planned test of the autonomous technology
- The total number of miles each autonomous vehicle tested in autonomous mode on public roads for each month
- The period of time elapsed from when the autonomous vehicle test driver was alerted of a technology failure and the driver assumed manual control of the vehicle.

If you have any questions regarding the report or require further information, please contact me at the below number.

Sincerely,

Susan Lee

Susan Lee
Nissan Research Center – Silicon Valley
1215 Bordeaux Drive, Sunnyvale, CA 94089
408.215.6901

Nissan Autonomous Vehicle (AV) Disengagement Report

Type Key/Definitions:

| Type # | Description | Reported? |
|--------|---|-----------|
| 1 | AV system fails and requires driver to take over. | YES |
| 2A | AV system does not recognize failure, but the driver needs to take over for safety. | YES |
| 2A-a | AV is about to collide with another vehicles or obstacles due to self-steering | YES |
| 2A-b | AV is about to rear-end another vehicle due to insufficient deceleration of the AV. | YES |
| 2A-c | Another vehicle is about to rear-end the AV due to sudden deceleration of the AV. | YES |
| 2B | AV driver is expecting a failure and can easily handle the disengagement (typical during early development) | NO |
| 3 | AV Driver stops AV mode voluntarily to finish experiment (End of experiment) | NO |

Results of Planned Tests:

**** Occurred during early development and failures were expected during these planned tests.**

| ID # | Date | Time | AV ID | Testing conditions | Location | Weather/r oadway conditions | Elaps ed time | Type |
|------|----------------------|----------|---------|--|-------------|-----------------------------|-----------------|------|
| | NOVEMBER 2014 | | | | | | | |
| 1 | 11/19/2014 | 11:26 AM | LEAF #2 | A route could not be generated due to a localization error. Autonomous control shut off and the driver resumed manual control of the AV. | City street | Cloudy, Dry.** | < 1 s | 1 |
| 2 | 11/20/2014 | 2:24 PM | LEAF #2 | CAN data rate began to deteriorate due to high loads on the on-board computer. As a result, autonomous control disengaged and driver resumed manual control of the AV. | City street | Rainy, Wet.** | 4 s | 1 |
| 3 | 11/21/2014 | 11:31 AM | LEAF #2 | A failure occurred in the AV controller. As a result, autonomous control disengaged and driver resumed manual control of the AV. | City street | Cloudy, Dry. ** | < 1 s | 1 |
| 4 | 11/21/2014 | 11:31 AM | LEAF #2 | A failure occurred in the AV controller. As a result, autonomous control disengaged and driver resumed manual control of the AV. | City street | Cloudy, Dry. ** | < 1 s | 1 |
| 5 | 11/21/2014 | 11:32 AM | LEAF #2 | A failure occurred in the AV controller. As a result, autonomous control disengaged and driver resumed manual control of the AV. | City street | Cloudy, Dry. ** | < 1 s | 1 |
| 6 | 11/28/2014 | 11:15 AM | LEAF #2 | A failure occurred in the AV controller. As a result, autonomous control disengaged and driver resumed manual control of the AV. | City street | Sunny, Dry. ** | 1.2 s | 1 |
| 7 | 11/28/2014 | 11:28 AM | LEAF #2 | AV did not recognize stopped vehicle in front of it. The driver overrode the system with manual brake input, causing the control to disengage. | City street | Sunny, Dry. ** | 0 s (over ride) | 2A-b |
| | | | | | | | | |
| | DECEMBER 2014 | | | | | | | |
| 1 | 12/2/2014 | 2:15 PM | LEAF #2 | A route could not be generated due to a localization error. Autonomous control shut off and the driver resumed manual control of the AV. | City street | Cloudy, Wet. ** | < 1 s | 1 |

| | | | | | | | | |
|----|-----------|----------|---------|--|-------------|-----------------|-----------------|------|
| 2 | 12/3/2014 | 11:20 AM | LEAF #2 | A route could not be generated due to a localization error. Autonomous control shut off and the driver resumed manual control of the AV. | City street | Rainy, Wet. ** | 1 s | 1 |
| 3 | 12/3/2014 | 12:17 PM | LEAF #1 | A problem with CAN bus data rate caused autonomous control to shut off. The driver resumed manual control of the AV. | City street | Rainy, Wet. ** | < 1 s | 1 |
| 4 | 12/3/2014 | 12:18 PM | LEAF #1 | A problem with CAN bus data rate caused autonomous control to shut off. The driver resumed manual control of the AV. | City street | Rainy, Wet. ** | < 1 s | 1 |
| 5 | 12/3/2014 | 12:18 PM | LEAF #1 | A problem with CAN bus data rate caused autonomous control to shut off. The driver resumed manual control of the AV. | City street | Rainy, Wet. ** | < 1 s | 1 |
| 6 | 12/3/2014 | 12:19 PM | LEAF #1 | A problem with CAN bus data rate caused autonomous control to shut off. The driver resumed manual control of the AV. | City street | Rainy, Wet. ** | < 1 s | 1 |
| 7 | 12/3/2014 | 12:22 PM | LEAF #1 | A failure with AV localization caused a problem with lateral control. As a result, the driver switched off AV mode and resumed manual control of the AV. | City street | Rainy, Wet. ** | < 1 s | 1 |
| 8 | 12/3/2014 | 1:56 PM | LEAF #1 | Localization failed and the system could not determine its position. As a result, the driver switched off AV mode and resumed manual control. | City street | Cloudy, Wet. ** | < 1 s | 1 |
| 9 | 12/3/2014 | 2:00 PM | LEAF #1 | A route could not be generated due to a localization error. Autonomous control shut off and the driver resumed manual control. | City street | Cloudy, Wet. ** | < 1 s | 1 |
| 10 | 12/3/2014 | 2:01 PM | LEAF #1 | A route could not be generated due to a localization error. Autonomous control shut off and the driver resumed manual control. | City street | Cloudy, Wet. ** | < 1 s | 1 |
| 11 | 12/3/2014 | 3:32 PM | LEAF #1 | A route could not be generated due to a localization error. Autonomous control shut off and the driver resumed manual control. | City street | Cloudy, Wet. ** | < 1 s | 1 |
| 12 | 12/5/2014 | 3:04 PM | LEAF #1 | A route could not be generated due to a localization error. Autonomous control shut off and the driver resumed manual control. | City street | Cloudy, Dry. ** | < 1 s | 1 |
| 13 | 12/5/2014 | 3:36 PM | LEAF #1 | A route could not be generated due to a localization error. Autonomous control shut off and the driver resumed manual control. | City street | Cloudy, Dry. ** | < 1 s | 1 |
| 14 | 12/5/2014 | 4:26 PM | LEAF #1 | A route could not be generated due to a localization error. Autonomous control shut off and the driver resumed manual control. | City street | Cloudy, Dry. ** | < 1 s | 1 |
| 15 | 12/5/2014 | 4:36 PM | LEAF #1 | A route could not be generated due to a localization error. Autonomous control shut off and the driver resumed manual control. | City street | Cloudy, Dry. ** | < 1 s | 1 |
| 16 | 12/9/2014 | 9:08 AM | LEAF #2 | A problem with CAN transmission data caused the controller to fail and autonomous control to shut off. After the failure, the driver resumed manual control. | City street | Sunny, Dry. ** | < 1 s | 1 |
| 17 | 12/9/2014 | 10:58 AM | LEAF #1 | A problem with CAN transmission data caused the controller to fail and autonomous control to shut off. After the failure, the driver resumed manual control. | City street | Cloudy, Dry. ** | < 1 s | 1 |
| 18 | 12/9/2014 | 11:11 AM | LEAF #1 | A problem with CAN transmission data caused the controller to fail and autonomous control to shut off. After the failure, the driver resumed manual control. | City street | Cloudy, Dry. ** | < 1 s | 1 |
| 19 | 12/9/2014 | 11:13 AM | LEAF #1 | To avoid a construction vehicle, the driver overrode the system with manual steering input, causing the control to disengage. | City street | Cloudy, Dry. ** | 0 s (over ride) | 2A-a |
| 20 | 12/9/2014 | 4:13 PM | LEAF #1 | To avoid a construction vehicle, the driver overrode the system with manual steering input, causing the control to disengage. | City street | Cloudy, Dry. ** | 0 s (over ride) | 2A-a |

| | | | | | | | | |
|----|---------------------|----------|---------|---|-------------|------------------------|-----------------|------|
| 21 | 12/12/2014 | 10:41 AM | LEAF #2 | A problem with CAN transmission data caused the controller to fail and autonomous control to shut off. After the failure, the driver resumed manual control. | City street | Cloudy, Wet. ** | < 1 s | 1 |
| 22 | 12/13/2014 | 4:32 PM | LEAF #2 | A vehicle pulling out of a parking lot was not recognized by AV perception system. The driver overrode the system with manual braking input, causing the control to disengage. | City street | Cloudy, Dry. ** | 0 s (over ride) | 2A-b |
| 23 | 12/15/2014 | 11:08 AM | LEAF #2 | The AV began to merge into lane behind another vehicle very closely. For safety, the driver overrode the system with manual braking input, causing the control to disengage. | City street | Cloudy, Wet. ** | 0 s (over ride) | 2A-b |
| 24 | 12/15/2014 | 12:27 PM | LEAF #2 | A vehicle pulling out of a parking lot was not recognized by AV perception system. The driver overrode the system with manual braking input, causing the control to disengage. | City street | Cloudy, Wet. ** | 0 s (over ride) | 2A-b |
| 25 | 12/15/2014 | 3:51 PM | LEAF #2 | The AV did not recognize a vehicle that stopped in front of it and failed to slow down. The driver overrode the system with manual braking input, causing the control to disengage. | City street | Sunny, Dry. ** | 0 s (over ride) | 2A-b |
| 26 | 12/15/2014 | 4:23 PM | LEAF #2 | A problem with CAN transmission data caused the controller to fail and autonomous control to shut off. After the failure, the driver resumed manual control. | City street | Cloudy, Dry. ** | < 1 s | 1 |
| 27 | 12/16/2014 | 2:47 PM | LEAF #2 | To avoid a construction vehicle, the driver overrode the system with manual steering input, causing the control to disengage. | City street | Cloudy, Dry. ** | 0 s (over ride) | 2A-a |
| 28 | 12/17/2014 | 9:57 AM | LEAF #2 | A route could not be generated due to a localization error. Autonomous control shut off and the driver resumed manual control. | City street | Cloudy, Wet. ** | 0 s (over ride) | 1 |
| 29 | 12/17/2014 | 10:13 AM | LEAF #2 | A route could not be generated due to a localization error. Autonomous control shut off and the driver resumed manual control... | City street | Cloudy, Wet. ** | < 1 s | 1 |
| 30 | 12/17/2014 | 10:13 AM | LEAF #2 | AV estimation logic failure caused autonomous control to shut off. After the failure, the driver resumed manual control. | City street | Cloudy, Wet. ** | < 1 s | 1 |
| 31 | 12/18/2014 | 11:09 AM | LEAF #2 | A route could not be generated due to a localization error. Autonomous control shut off and the driver resumed manual control. | City street | Cloudy, Dry. ** | < 1 s | 1 |
| 32 | 12/22/2014 | 11:48 AM | LEAF #1 | Localization logic failed. The driver overrode the system with manual brake input, causing the autonomous control to disengage. | City street | Sunny, Dry. ** | 0 s (over ride) | 1 |
| | | | | | | | | |
| | JANUARY 2015 | | | | | | | |
| 1 | 1/4/2015 | 5:23 PM | LEAF #1 | Unknown failure caused the AV to slow to a stop. The driver overrode the system with manual acceleration input, causing the control to disengage. | City street | Clear (night), Dry. ** | 0 s (over ride) | 1 |
| 2 | 1/5/2015 | 10:55 AM | LEAF #1 | Unknown failure caused the AV to slow to a stop. The driver overrode the system with manual acceleration input, causing the control to disengage. | City street | Sunny, Dry. ** | 0 s (over ride) | 1 |
| 3 | 1/5/2015 | 10:56 AM | LEAF #1 | Unknown failure caused the AV to slow to a stop. The driver overrode the system with manual acceleration input, causing the control to disengage. | City street | Sunny, Dry. ** | 0 s (over ride) | 1 |
| 4 | 1/5/2015 | 11:14 AM | LEAF #1 | Too many pedestrians and vehicles at the intersection for the system to predictably handle. As a safety measure, the driver overrode the system | City street | Sunny, Dry. ** | 0 s (over ride) | 2A |

| | | | | | | | | |
|----|----------|----------|---------|---|-------------|------------------------|-----------------|------|
| | | | | with manual brake input, causing the control to disengage. | | | | |
| 5 | 1/5/2015 | 3:58 PM | LEAF #1 | Departure logic failed, and the AV would not begin moving. The driver overrode the system with manual acceleration input, causing the control to disengage. | City street | Sunny, Dry. ** | 0 s (over ride) | 1 |
| 6 | 1/5/2015 | 4:00 PM | LEAF #1 | Departure logic failed, and the AV would not begin moving. The driver overrode the system with manual acceleration input, causing the control to disengage. | City street | Sunny, Dry. ** | 0 s (over ride) | 1 |
| 7 | 1/5/2015 | 4:00 PM | LEAF #1 | Departure logic failed, and the AV would not begin moving. The driver overrode the system with manual acceleration input, causing the control to disengage. | City street | Sunny, Dry. ** | 0 s (over ride) | 1 |
| 8 | 1/5/2015 | 4:16 PM | LEAF #1 | Unknown failure caused the AV to slow to a stop. The driver overrode the system with manual acceleration input, causing the control to disengage. | City street | Sunny, Dry. ** | 0 s (over ride) | 1 |
| 9 | 1/5/2015 | 4:30 PM | LEAF #1 | A vehicle stopped suddenly in front of AV at an intersection. For safety, the driver overrode the system with manual brake input, causing the control to disengage. | City street | Sunny, Dry. ** | 0 s (over ride) | 2A-b |
| 10 | 1/5/2015 | 4:44 PM | LEAF #1 | Departure logic failed, and the AV would not begin moving. The driver overrode the system with manual acceleration input, causing the control to disengage. | City street | Sunny, Dry. ** | 0 s (over ride) | 1 |
| 11 | 1/5/2015 | 10:36 PM | LEAF #1 | While the AV was coming to a stop autonomously, another vehicle approached from the side but was undetected by the perception system. For safety, the driver overrode the system with manual braking input, causing the control to disengage. | City street | Clear (night), Dry. ** | 0 s (over ride) | 2A-a |
| 12 | 1/5/2015 | 10:44 PM | LEAF #1 | Departure logic failed, and the AV would not begin moving. The driver overrode the system with manual acceleration input, causing the control to disengage. | City street | Clear (night), Dry. ** | 0 s (over ride) | 1 |
| 13 | 1/5/2015 | 10:44 PM | LEAF #1 | Departure logic failed, and the AV would not begin moving. The driver overrode the system with manual acceleration input, causing the control to disengage. | City street | Clear (night), Dry. ** | 0 s (over ride) | 1 |
| 14 | 1/5/2015 | 11:57 PM | LEAF #1 | Departure logic failed, and the AV would not begin moving. The driver overrode the system with manual acceleration input, causing the control to disengage. | City street | Clear (night), Dry. ** | 0 s (over ride) | 1 |
| 15 | 1/6/2015 | 11:38 AM | LEAF #1 | Departure logic failed, and the AV would not begin moving. The driver overrode the system with manual acceleration input, causing the control to disengage. | City street | Sunny, Dry. ** | 0 s (over ride) | 1 |
| 16 | 1/6/2015 | 11:40 AM | LEAF #1 | Departure logic failed, and the AV would not begin moving. The driver overrode the system with manual acceleration input, causing the control to disengage. | City street | Sunny, Dry. ** | 0 s (over ride) | 1 |
| 17 | 1/6/2015 | 11:41 AM | LEAF #1 | Departure logic failed, and the AV would not begin moving. The driver overrode the system with manual acceleration input, causing the control to disengage. | City street | Sunny, Dry. ** | 0 s (over ride) | 1 |
| 18 | 1/6/2015 | 6:15 PM | LEAF #1 | Departure logic failed, and the AV would not begin moving. The driver overrode the system with manual acceleration input, causing the control to disengage. | City street | Clear (night), Dry. ** | 0 s (over ride) | 1 |

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|---------------------|------------|----------|---------|---|------------------|------------------------|-----------------|------|
| 19 | 1/6/2015 | 6:21 PM | LEAF #1 | Departure logic failed, and the AV would not begin moving. The driver overrode the system with manual acceleration input, causing the control to disengage. | City street | Clear (night), Dry. ** | 0 s (over ride) | 1 |
| 20 | 1/6/2015 | 6:26 PM | LEAF #1 | Departure logic failed, and the AV would not begin moving. The driver overrode the system with manual acceleration input causing the control to disengage. | City street | Clear (night), Dry. ** | 0 s (over ride) | 1 |
| 21 | 1/6/2015 | 10:07 PM | LEAF #1 | Generation of route goal failed causing the AV to come to a stop. The driver overrode the system with manual acceleration input and resumed manual control. | City street | Clear (night), Dry. ** | 0 s (over ride) | 1 |
| 22 | 1/6/2015 | 10:23 PM | LEAF #1 | Departure logic failed, and the AV would not begin moving. The driver overrode the system with manual acceleration input, causing the control to disengage. | City street | Clear (night), Dry. ** | 0 s (over ride) | 1 |
| 23 | 1/6/2015 | 10:40 PM | LEAF #1 | AV position estimation failure caused the AV to begin traveling outside of its lane. The driver overrode the system with manual steering input, causing the control to disengage. | City street | Clear (night), Dry. ** | 0 s (over ride) | 1 |
| 24 | 1/7/2015 | 8:37 AM | LEAF #1 | AV position estimation failure caused the AV to begin traveling outside of its lane. The driver overrode the system with manual steering input, causing the control to disengage. | City street | Sunny, Dry. ** | 0 s (over ride) | 1 |
| 25 | 1/7/2015 | 8:38 AM | LEAF #1 | Departure logic failed, and the AV would not begin moving. The driver overrode the system with manual acceleration input, causing the control to disengage. | City street | Sunny, Dry. ** | 0 s (over ride) | 1 |
| 26 | 1/7/2015 | 8:38 AM | LEAF #1 | Departure logic failed, and the AV would not begin moving. The driver overrode the system with manual acceleration input, causing the control to disengage. | City street | Sunny, Dry. ** | 0 s (over ride) | 1 |
| 27 | 1/7/2015 | 8:40 AM | LEAF #1 | A vehicle stopped suddenly in front of AV at an intersection. For safety, the driver overrode the system with manual brake input, causing the control to disengage. | City street | Sunny, Dry. ** | 0 s (over ride) | 2A-b |
| 28 | 1/7/2015 | 8:45 AM | LEAF #1 | Departure logic failed, and the AV would not begin moving. The driver overrode the system with manual acceleration input, causing the control to disengage. | City street | Sunny, Dry. ** | 0 s (over ride) | 1 |
| 29 | 1/7/2015 | 8:52 AM | LEAF #1 | AV position estimation failure caused the AV to begin traveling outside of its lane. The driver overrode the system with manual steering input, causing the control to disengage. | City street | Sunny, Dry. ** | 0 s (over ride) | 1 |
| 30 | 1/7/2015 | 9:00 AM | LEAF #1 | Departure logic failed, and the AV would not begin moving. The driver overrode the system with manual acceleration input, causing the control to disengage. | City street | Sunny, Dry. ** | 0 s (over ride) | 1 |
| 31 | 1/7/2015 | 9:00 AM | LEAF #1 | A route could not be generated due to a localization error. Autonomous control shut off and the driver resumed manual control of the AV. | City street | Sunny, Dry. ** | 0 s (over ride) | 1 |
| OCTOBER 2015 | | | | | | | | |
| 1 | 10/17/2015 | 9:40 AM | Q50#1 | After the AV turned right at the intersection, the recognition system lost the trajectory of the preceding vehicle. Control was disengaged and the driver resumed manual control. | City street | Cloudy, Dry. ** | < 1 s | 1 |
| 2 | 10/17/2015 | 2:59 PM | Q50#1 | When the AV was turning onto a ramp with a small curve, the recognition system lost the trajectory of | City and highway | Cloudy, Dry. ** | < 1 s | 1 |

| | | | | | | | | |
|----|------------|----------|-------|--|------------------|-----------------|-------|------|
| | | | | preceding vehicle. Control was disengaged and the driver resumed manual control. | | | | |
| 3 | 10/17/2015 | 3:10 PM | Q50#1 | When the AV was turning onto a ramp with a small curve, the recognition system lost the trajectory of preceding vehicle. Control was disengaged and the driver resumed manual control. | City and highway | Cloudy, Dry. ** | < 1 s | 1 |
| 4 | 10/17/2015 | 5:20 PM | Q50#1 | When the AV was turning onto a ramp with a small curve, the recognition system lost the trajectory of preceding vehicle. Control was disengaged and the driver resumed manual control. | City and highway | Sunny, Dry. ** | < 1 s | 1 |
| 5 | 10/20/2015 | 3:07 PM | Q50#1 | When the AV was turning onto a ramp with a small curve, the recognition system lost the trajectory of preceding vehicle. Control was disengaged and the driver resumed manual control. | City and highway | Sunny, Dry. ** | < 1 s | 1 |
| 6 | 10/21/2015 | 9:45 AM | Q50#1 | When the AV was turning onto a ramp with a small curve, the recognition system lost the trajectory of preceding vehicle. Control was disengaged and the driver resumed manual control. | City and highway | Sunny, Dry. ** | < 1 s | 1 |
| 7 | 10/21/2015 | 4:43 PM | Q50#1 | Recognition system lost the preceding vehicle stopped at the intersection. Control was disengaged and the driver resumed manual control. | City and highway | Sunny, Dry. ** | < 1 s | 2A-b |
| 8 | 10/22/2015 | 9:57 AM | Q50#1 | When the AV was turning onto a ramp with a small curve, the recognition system lost the trajectory of preceding vehicle. Control was disengaged and the driver resumed manual control. | City and highway | Sunny, Dry. ** | < 1 s | 1 |
| 9 | 10/23/2015 | 10:36 AM | Q50#1 | When the AV was turning onto a ramp with a small curve, the recognition system lost the trajectory of preceding vehicle. Control was disengaged and the driver resumed manual control. | City and highway | Sunny, Dry. ** | < 1 s | 1 |
| 10 | 10/23/2015 | 4:28 PM | Q50#1 | The AV was slowly encroaching on the preceding vehicle. The driver took over the braking operation immediately for safety. | City and highway | Sunny, Dry. ** | < 1 s | 2A-b |
| 11 | 10/23/2015 | 4:29 PM | Q50#1 | The AV was slowly encroaching on the preceding vehicle. The driver took over the braking operation immediately for safety. | City and highway | Sunny, Dry. ** | < 1 s | 2A-b |
| 12 | 10/23/2015 | 4:45 PM | Q50#1 | Departure logic failed, and the AV would not begin moving. The driver overrode the system with manual acceleration input, causing the control to disengage. | City and highway | Sunny, Dry. ** | < 1 s | 1 |
| 13 | 10/24/2015 | 10:08 AM | Q50#1 | After the AV turned right at the intersection, the recognition system lost the trajectory of the preceding vehicle. Control was disengaged and the driver resumed manual control. | City and highway | Sunny, Dry. ** | < 1 s | 1 |
| 14 | 10/24/2015 | 1:41 PM | Q50#1 | Departure logic failed, and the AV would not begin moving. The driver overrode the system with manual acceleration input, causing the control to disengage. | City and highway | Sunny, Dry. ** | < 1 s | 1 |
| 15 | 10/24/2015 | 1:47 PM | Q50#1 | When the AV was turning onto a ramp with a small curve, the recognition system lost the trajectory of preceding vehicle. Control was disengaged and the driver resumed manual control. | City and highway | Sunny, Dry. ** | < 1 s | 1 |
| 16 | 10/24/2015 | 1:53 PM | Q50#1 | Recognition system lost track of the preceding vehicle when the preceding vehicle stopped for the red light at the intersection. Control was disengaged and the driver resumed manual control. | City and highway | Sunny, Dry. ** | < 1 s | 2A-a |
| 17 | 10/24/2015 | 1:56 PM | Q50#1 | After the AV turned right at the intersection, the recognition system lost the trajectory of the preceding vehicle. Control was disengaged and the driver resumed manual control. | City and highway | Sunny, Dry. ** | < 1 s | 1 |

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|----------------------|------------|----------|---------|---|-----------------------|-----------------|-----------------|------|
| 18 | 10/24/2015 | 2:14 PM | Q50#1 | After the AV turned right at the intersection, the recognition system lost the trajectory of the preceding vehicle. Control was disengaged and the driver resumed manual control.. | City and highway | Sunny, Dry. ** | < 1 s | 1 |
| 19 | 10/24/2015 | 2:27 PM | Q50#1 | After the AV turned left at the intersection, the recognition system lost the trajectory of the preceding vehicle. Control was disengaged and the driver resumed manual control. | City and highway | Sunny, Dry. ** | < 1 s | 1 |
| 20 | 10/24/2015 | 2:29 PM | Q50#1 | When the AV was turning onto the small curve on the ramp, the recognition system lost the trajectory of preceding vehicle. Control was disengaged and the driver resumed manual control. | City and highway | Sunny, Dry. ** | < 1 s | 1 |
| 21 | 10/24/2015 | 2:31 PM | Q50#1 | The recognition system lost the trajectory of the preceding vehicle. The driver resumed manual control. | City and highway | Sunny, Dry. ** | < 1 s | 1 |
| 22 | 10/24/2015 | 2:35 PM | Q50#1 | Because the driver felt a delay in deceleration, the driver took over the brake operation. As a result, the autonomous control was disengaged. | City and highway | Sunny, Dry. ** | 0 s (over ride) | 2A-b |
| 23 | 10/25/2015 | 9:41 AM | Q50#1 | Departure logic failed, and the AV would not begin moving. The driver overrode the system with manual acceleration input, causing the control to disengage. | City and highway | Sunny, Dry. ** | < 1 s | 1 |
| 24 | 10/25/2015 | 9:45 AM | Q50#1 | Departure logic failed, and the AV would not begin moving. The driver overrode the system with manual acceleration input, causing the control to disengage. | City and highway | Sunny, Dry. ** | < 1 s | 1 |
| 25 | 10/25/2015 | 10:40 AM | Q50#1 | Departure logic failed, and the AV would not begin moving. The driver overrode the system with manual acceleration input, causing the control to disengage. | City and highway | Sunny, Dry. ** | < 1 s | 1 |
| 26 | 10/27/2015 | 10:56 AM | Q50#2 | System incorrectly recognized the preceding vehicle as a vehicle in the next lane. For safety, the driver took over the braking operation immediately. | City and highway | Cloudy, Dry. ** | 0 s (over ride) | 2A-b |
| 27 | 10/27/2015 | 11:17 AM | Q50#2 | While the AV was turning right at the intersection, the recognition system lost the trajectory of the preceding vehicle. Control was disengaged and the driver resumed manual control. | City and highway | Cloudy, Dry. ** | < 1 s | 1 |
| 28 | 10/28/2015 | 1:24 PM | Q50#2 | The recognition system lost the trajectory of the preceding vehicle. Control was disengaged and the driver resumed manual control. | City and highway | Sunny, Dry. ** | < 1 s | 1 |
| NOVEMBER 2015 | | | | | | | | |
| 1 | 11/7/2015 | 5:32 PM | LEAF #1 | While the AV was merging autonomously, another vehicle approached in front of the AV suddenly. It was undetected by perception system. For safety, the driver overrode the system with manual braking input, causing the control to disengage | City Street Route 237 | Sunny, Dry** | 0 s (over ride) | 2A-b |
| 2 | 11/25/2015 | 10:27 AM | Q50#2 | Because the preceding vehicle trajectory was detected further to the left than in reality, our AV drove too close to the left side of the lane. The AV did not enter the incorrect lane but the driver resumed manual control for safety. | City and highway | Cloudy, Dry. ** | < 1 s | 2A |
| 3 | 11/25/2015 | 11:16 AM | Q50#2 | While the AV was turning left at the intersection, the recognition system lost the trajectory of the preceding vehicle. As a result, control was disengaged, and the driver resumed manual control. | City and highway | Cloudy, Dry. ** | < 1 s | 2A-a |

| | | | | | | | | |
|---|------------|----------|-------|--|------------------|-----------------|-------|------|
| 4 | 11/26/2015 | 11:16 AM | Q50#2 | While the AV was turning left at the intersection, the recognition system lost the trajectory of the preceding vehicle. The driver resumed manual control. | City and highway | Sunny, Dry. ** | < 1 s | 1 |
| 5 | 11/26/2015 | 11:21 AM | Q50#2 | Recognition system lost the preceding vehicle at an intersection. As a result, control was disengaged and the driver resumed manual control | City and highway | Sunny, Dry. ** | < 1 s | 2A-b |
| 6 | 11/26/2015 | 1:32 PM | Q50#2 | As a preceding vehicle was decelerating for a red light, the AV Recognition system lost track of it. As a result, brake control was released and the AV encroached on the preceding vehicle. | City and highway | Sunny, Dry. ** | < 1 s | 2A-b |
| 7 | 11/26/2015 | 1:36 PM | Q50#2 | As a preceding vehicle was decelerating for a red light, the AV Recognition system lost track of it. As a result, brake control was released and the AV encroached on the preceding vehicle. | City and highway | Sunny, Dry. ** | < 1 s | 2A-b |
| 8 | 11/30/2015 | 10:03 AM | Q50#1 | When the AV was turning onto a ramp with a small curve, the recognition system lost the trajectory of preceding vehicle. The driver resumed manual control. | City and highway | Cloudy, Dry. ** | < 1 s | 1 |

** Occurred during early development and failures were expected during these planned tests.

Summary

| Month- Year | Total # of disengagements | Total Miles on public roads |
|---------------|---------------------------|-----------------------------|
| November-2014 | 7 | 112.7 |
| December-2014 | 32 | 366.6 |
| January-2015 | 31 | 117.7 |
| February-2015 | 0 | 16.4 |
| March-2015 | 0 | 5.0 |
| Oct-2015 | 28 | 374.9 |
| Nov-2015 | 8 | 492.1 |
| Total | 106 | 1485.4 |