U.S. Department of Transportation

National Highway Traffic Safety Administration

ODI RESUME

Investigation: PE 11-037
Date Opened: 11/25/2011 **Date Closed:** 01/20/2012
Investigator: Emily Reichard **Reviewer:** Scott Yon
Approver: Frank Borris
Subject: Post-Crash EV Fire Hazard

MANUFACTURER & PRODUCT INFORMATION

Manufacturer: GENERAL MOTORS LLC
Products: 2011-2012 Chevrolet Volt
Population: 14,735

Problem Description: Intrusion in a crash may damage the battery, which may result in a substantial thermal reaction and fire.

FAILURE REPORT SUMMARY

	ODI	Manufacturer	Total
Complaints:	0	0	0
Crashes/Fires:	0	0	0
Injury Incidents:	0	0	0
Fatality Incidents:	0	0	0
Other*:	4	0	4

***Description of Other:** NHTSA tests of subject vehicle or its batteries that resulted in thermal reaction or fire

ACTION / SUMMARY INFORMATION

Action: This Preliminary Evaluation has been closed.

Summary:

The subject vehicles, which employ emerging technology, are range-extended electric vehicles that utilize a high voltage (HV) battery to provide energy for propulsion. The HV battery is lithium-ion based technology that has a nominal full charge of 390 VDC, a 16 kWh capacity, and a control system that incorporates liquid (antifreeze) cooling and various electronic devices (control modules, sensors, wiring, etc) to monitor and manage the HV battery. The HV battery, portions of the cooling system, and the control system are contained within a common enclosure.

During an NCAP oblique side pole impact test conducted by NHTSA in May 2011, the pole struck and deformed the sill plate under the driver's door at a location where there is a structural member. The lateral member displaced inward, pierced the HV battery enclosure and battery, and caused a battery coolant leak. Thereafter, the Agency conducted a rollover test (the rollover test consists of four 90-degree rotate-and-hold movements about the vehicle's longitudinal axis). In that test, the HV battery and electronics were exposed to coolant that leaked as a result of the crash. The vehicle fire that occurred three weeks later and the additional testing NHTSA conducted are discussed in a report titled "2011 Chevrolet Volt Battery Fire Incident Report" a copy of which is available in the public file. The report indicates that intrusion induced coolant leakage, and subsequent rollover that saturates electronic components, were the only test conditions which resulted in a subject vehicle HV battery fire.

GM announced its intention to conduct a free-of-charge customer satisfaction campaign (CSP) on the subject vehicles on January 5, 2012. The action affects 14,735 vehicles produced prior to December 21, 2011. The CSP addresses three areas related to the issue under investigation. The first involves a modification/strengthening of the structure of the vehicle in the area where battery intrusion occurred in the May 2011 test. The second involves adding a sensor that detects excessive HV battery coolant loss, and control system software that then alerts the driver and prevents recharging of the HV battery. When the battery cannot be recharged, it will be depleted to a lower energy state as the

vehicle continues to operate on the internal combustion engine. Lastly, a tamper-proofing device will be added to the system to prevent consumers from adding coolant. GM discusses these revisions in its response to an Information Request (IR) issued by NHTSA, noting that vehicles produced in calendar year 2012 and later will be manufactured to this condition.

In December 2011, and at the same test facility, NHTSA repeated the May 2011 side impact test using a model year 2012 Volt modified to the structural condition described in the CSP. The test did not produce intrusion of the HV battery, a coolant leakage, or a fire (see test 7611, available at www.nhtsa.gov/Research/Databases+and+Software). In its IR response, GM describes four (4) additional side impact tests of modified subject vehicles it recently conducted using various build configurations and impact speeds (including higher speeds). GM reports that none produced HV battery intrusion, coolant leakage, or a fire.

As noted in the complaint counts above, ODI has not identified a crash occurring in consumers' use of the vehicle that has resulted in a vehicle fire, or produced coolant leakage. ODI notes that side impact crashes with pole-like structures, such as would strike the sill plate, occur fairly infrequently, and such crashes with rollovers are even less frequent. A defect trend has not been identified at this time, and further investigation does not appear to be warranted. Accordingly, the investigation is closed. The closing of this investigation does not constitute a finding by NHTSA that a safety-related defect does not exist, and the agency reserves the right to take additional action if warranted by new circumstances.