SUZUKI

SUZUKI MOTOR OF AMERICA, INC.

November 3, 2014

Jennifer T. Timian, Chief
Recall Management Division (NVS-215)
National Highway Traffic Safety Administration
1200 New Jersey Avenue, SE
Washington, D.C. 20590

Dear Ms. Timian:

Re: Recall 14V-629 –Part 573 Report Update

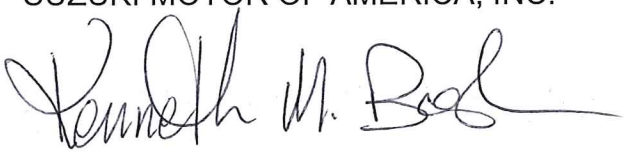
On October 3, 2014, Suzuki Motor of America, Inc. ("SMAI") submitted a Part 573 report concerning a defect in 2011-2014 Suzuki GSX-R750 and 2009-2014 Suzuki GSX-R1000 motorcycles.

Attached is an expanded "Chronology of Principal Events" to update the October 3, 2014 report.

Please contact me if you have any questions concerning this matter.

Sincerely,

SUZUKI MOTOR OF AMERICA, INC.



Kenneth M. Bush
Department Manager, Government Relations

1. Chronology of Principal Events

May-June, 2012	Suzuki Motor Corporation (SMC) received three Field Technical Information Reports (FTIRs) from the U.S. distributor. May 10, 2012(1):Drive chain adjuster position moved May 11, 2012(2):Drive chain came off May 18, 2012(3):Drive chain adjuster position moved <Investigation> Upon receiving these FTIRs, SMC collected the drive chain adjuster (left), drive sprocket, driven sprocket, drive shaft, rear axle shaft nut, swing arm, and drive chain from the 3 motorcycles above. Suzuki could not find any damage on the collected parts caused by foreign materials getting caught. SMC also confirmed that the strength, size (excluding the broken part), and material element specifications of the affected chain adjusters were within the design tolerances. SMC measured the strength of chain adjusters, and confirmed that the strength is higher than the estimated maximum force (12kN) that would be applied during a sudden start (at an engine speed of 10,000 rpm) with a loosened rear axle shaft nut. SMC tried to reproduce the problem under the most severe condition that could be expected in normal use, and SMC could not reproduce the problem. These severe conditions are: 1. Drive with a loosened rear axle shaft nut (Specification of tightening torque is 100N-m, Tightening torque of a loosened nut is less than 10N-m) 2. Sudden start with a loosened rear axle shaft nut 3. Drive with an over-tensioned drive chain 4. Drive with a loosened drive chain (The position of the axle shaft is the most forward position.) SMC also tried launching a motorcycle with a shop towel jammed between the drive chain and rear sprocket under the above conditions and was able to reproduce the problem.

June 13, 2012	SMC's Quality Assurance Committee met and discussed the results of the investigation for case (2). The Committee did not reach a conclusion.
June 25, 2012	SMC's Quality Assurance Subcommittee met and discussed the results of the investigation for cases (1). <Judgment> SMC judged the cause of the problem could be jamming of a soft foreign material between the chain and sprocket. <Conclusion> SMC decided to monitor information from the field.
June 27, 2012	SMC's Quality Assurance Committee met and again discussed the results of the investigation for cases (2). <Judgment> SMC judged the cause of the problem could be jamming of a soft foreign material between the chain and sprocket. <Conclusion> SMC decided to monitor information from the field.
July 3, 2012	SMC's Quality Assurance Subcommittee met and discussed the results of the investigation for case (3). <Judgment> SMC judged the cause of the problem could be jamming of a soft foreign material between the chain and sprocket. <Conclusion> SMC decided to monitor information from the field.
October, 2012	SMC received an FTIR from the U.S. distributor. Oct 11, 2012(4): The customer claimed that the drive chain broke while riding. <Investigation> SMC investigated the collected chain and sprocket,

	and found marks consistent with catching something between the chain and sprocket.
November 21, 2012	SMC's Quality Assurance Committee met and discussed the results of the investigation for case (4). <Judgment> SMC judged that the broken chain was caused by catching some hard material between the chain and sprocket while riding. <Conclusion> SMC decided to monitor information from the field because the problem was caused by an unusual external condition.
December, 2012	SMC received an FTIR from the U.S. distributor. Dec 5, 2012(5): Drive chain adjuster position moved <Investigation> SMC investigated the collected drive chain adjuster (left), and confirmed that the strength, size, (excluding the broken part), and material element specifications were within the design tolerances. SMC could not collect other related parts.
January 9, 2013	SMC's Quality Assurance Committee met and discussed the results of the investigation for case (5). <Judgment> SMC judged that the cause of the problem could be jamming of a soft or hard foreign material between the chain and sprocket, because the problem was very similar to that described in the previous FTIRs. <Conclusion> SMC decided to monitor information from the field because the broken chain adjuster seemed to be the same as in previous cases, which were judged to be due to an unusual external condition.
May - August, 2013	SMC received four FTIRs from the U.S. distributor. May 6, 2013(6):Drive chain adjuster position moved Aug 12, 2013(7):Drive chain adjuster position moved

	Aug 12, 2013(8):Drive chain came off Aug 26, 2013(9):Drive chain adjuster position moved <Investigation> SMC investigated three collected drive chain adjusters (6, 7, and 8) and one chain (6), and confirmed that the strength, size (excluding the broken part), and material element specifications were within the design tolerances. SMC could not collect other related parts. SMC conducted a further investigation using fault tree analysis.
July 24, 2013	SMC's Quality Assurance Committee met and discussed the results of the investigation for case (6). <Judgment> SMC judged that the cause of the problem could be jamming of a soft or hard foreign material between the chain and sprocket, because the problem was very similar to that described in the previous FTIRs. <Conclusion> SMC decided to monitor information from the field because the broken chain adjusters seemed to be the same as in previous cases, which were judged to be due to an unusual external condition.
September 23, 2013	SMC's Quality Assurance Subcommittee met and discussed the results of the investigation for case (7). <Judgment> SMC judged that the cause of the problem could be jamming of a soft or hard foreign material between the chain and sprocket, because the problem was very similar to that described in the previous FTIRs. <Conclusion> SMC decided to monitor information from the field because the broken chain adjusters seemed to be the same as in previous cases, which were judged to be due to an unusual external condition.
September 25, 2013	SMC's Quality Assurance Committee met and discussed the results of the investigation for case (8).

	<Judgment> SMC judged that the cause of the problem could be jamming of a soft or hard foreign material between the chain and sprocket, because the problem was very similar to that described in the previous FTIRs. <Conclusion> SMC decided to monitor information from the field because the broken chain adjusters seemed to be the same as in previous cases, which were judged to be due to an unusual external condition.
October-November, 2013	SMC received five FTIRs from the U.S. distributor. Oct 10, 2013(10):Drive chain came off Oct 14, 2013(11):Drive chain adjuster position moved Oct 15, 2013(12):Drive chain adjuster position moved Oct 17, 2013(13):Drive chain adjuster position moved Nov 6, 2013(14):Drive chain adjuster position moved <Investigation> Due to the increasing number of customer claims, SMC thought it was necessary to look for a cause of the problem other than foreign material getting caught between the drive chain and sprocket. From Nov 12 to Nov 15, an SMC Engineer and Quality Assurance representative visited the U.S., and investigated 5 cases (6, 8, 10, 11 and 14) with one Service staff member of the U.S. distributor. The investigation included interviews of the user and dealer service technician, and investigation of two affected vehicles (10 and 14). SMC could not find any new facts related to cause of the problem, and could not find any new facts to refute the previous judgment. Then, SMC collected two affected vehicles (10 and 14) to conduct dimensional measurements for further investigation.
November 27, 2013	SMC's Quality Assurance Committee met and discussed the results of the investigation for cases (11), (12) and (13). <Judgment>

	SMC judged that the cause of the problem could be jamming of a soft or hard foreign material between the chain and sprocket, because the problem was very similar to that described in the previous FTIRs. <Conclusion> SMC decided to monitor information from the field because the broken chain adjusters seemed to be the same as in previous cases, which were judged to be due to an unusual external condition.
December 25, 2013	SMC's Quality Assurance Committee met and discussed the results of the investigation for case (9). <Judgment> SMC judged that the cause of the problem could be jamming of a soft or hard foreign material between the chain and sprocket, because the problem was very similar to that described in the previous FTIRs. <Conclusion> SMC decided to monitor information from the field because the broken chain adjusters seemed to be the same as in previous cases, which were judged to be due to an unusual external condition.
January-March, 2014	SMC received three FTIRs from the U.S. distributor. Jan 28, 2014(15):Drive chain adjuster position moved Mar 11, 2014(16):Drive chain adjuster position moved Mar 18, 2014(17):Drive chain adjuster position moved <Investigation> 1. SMC investigated the previously-collected vehicles (10 and 14). 3D measurements of the assembled vehicles did not show any problem. SMC was unable to reproduce the problem by riding an affected vehicle (14). Size measurements of related parts did not show any problem. 2. Through further investigation, SMC found that abnormal usage such as "jack knife and landing with high rotation of the rear wheel" or "jump and landing with high rotation of the rear wheel" could reproduce the problem of damage to the drive chain adjuster.

March 20, 2014	SMC's Quality Assurance Committee met and discussed the results of the investigation for cases (10), (14), and (15). <Judgment> SMC judged that the inertial force generated by the rear wheel landing with high speed rotation due to abnormal usage could be a possible cause of damage to the chain adjuster. <Conclusion> SMC decided to monitor information from the field because the cause of the problem was judged to be abnormal usage such as "jack knife and landing with high speed rotation of the rear wheel" or "jump and landing with high speed rotation of the rear wheel".
April-June, 2014	SMC received ten FTIRs from the U.S. distributor. Apr 15, 2014(18):Drive chain adjuster position moved Apr 18, 2014(19):Drive chain adjuster position moved May 6, 2014(20):Drive chain adjuster position moved May 29, 2014(21):Drive chain adjuster position moved May 29, 2014(22):Drive chain came off May 30, 2014(23):Drive chain adjuster position moved Jun 4, 2014(24):Drive chain adjuster position moved Jun 9, 2014(25):Drive chain came off Jun 9, 2014(26):Drive chain came off Jun 26, 2014(27):Drive chain came off <Investigation> Due to the increasing number of customer claims and the reported case of falling down, SMC continued its investigation to look for a cause of the problem other than foreign material getting caught between the drive chain and sprocket and abnormal use. In early June, SMC found that chain adjuster breakage could be reproduced on the subject GSX-R750 and GSX-R1000 motorcycles, but not on the GSX-R600, by upshifting from the neutral position at a high engine speed without disengaging the clutch. Tests were conducted by riding at 60 km/h in neutral, revving

	the engine by opening the throttle, and shifting to 2nd gear from neutral with the clutch engaged when the engine speed reaches approximately 7,000 rpm. From Jun 13 to Jun 21, an SMC Engineer and representatives of SMC's Quality Assurance and Service groups (a total of 4 persons), visited the U.S. and investigated 4 cases (21, 22, 23 and 25) with one Service staff member of the U.S. distributor. The investigation included interviews of customer usage (including the customer that reported falling down). SMC obtained testimony from a customer (case 21) that reported mis-shifting before the chain adjuster broke. The customer stated that the customer had experienced difficulty shifting from 1st gear to 2nd gear twice. On both occasions, the gear was connected with shock after clutch lever release. <Force measurement No. 1> SMC measured the force applied to the chain adjuster on the GSX-R600 and subject GSX-R750 motorcycles and found that the measured force exceeded the adjuster strength for both models. <Conclusion> SMC could not conclude that the cause of adjuster breakage was the shock after mis-shifting because other models with a similar (but not identical) adjuster design did not have incidents of adjuster breakage. SMC decided to conduct additional verification.
May 15, 2014	SMC's Quality Assurance Committee met and discussed the results of the investigation for case (16). <Judgment> SMC judged that the inertial force generated by the rear wheel landing with high speed rotation due to abnormal usage could be a possible cause of damage to the chain adjuster. <Conclusion> SMC decided to monitor information from the field because the cause of the problem was judged to be abnormal usage such as "jack knife and landing with

	high speed rotation of the rear wheel" or "jump and landing with high speed rotation of the rear wheel".
June 5, 2014	SMC's Quality Assurance Committee met and discussed the results of the investigation for cases (18) and (19). <Judgment> SMC judged that the inertial force generated by the rear wheel landing with high speed rotation due to abnormal usage could be a possible cause of damage to the chain adjuster. <Conclusion> SMC decided to monitor information from the field because the cause of the problem was judged to be abnormal usage such as "jack knife and landing with high speed rotation of the rear wheel" or "jump and landing with high speed rotation of the rear wheel".
July, 2014	<Force measurement No. 2> In June, although SMC measured the shifting force on the GSX-R600 chain adjuster as higher than the strength of the chain adjuster, the GSX-R600 chain adjuster did not break during the mis-shifting breakage test. Since the test condition was not clearly fixed in June for the GSX-R600, the measurement conditions on each run were inconsistent. Based on this, SMC decided to conduct force measurement under the same conditions on 9 models having a similar (but not identical) chain adjuster configuration. Tests were conducted by riding at 60 km/h in neutral, revving the engine to approximately 9000 rpm, and shifting to 2nd gear from neutral with the clutch engaged. The data showed that there were 6 models other than the subject models with force measurements greater than the strength of the chain adjuster. <Verification using another reproduction pattern> SMC tried disengaging the clutch and shifting to 1st gear while riding at 100 km/h, and then rapidly engaging the clutch. SMC was unable to reproduce the chain adjuster problem using this pattern. <Comparison of engagement chance of gear dogs>

	Since the shape of the gear engagement dogs is different for different models, SMC compared the chance of engaging the 2nd gear dogs for several different models. However, SMC could not find relevance to this issue.
August, 2014	SMC received one FTIR from the U.S. distributor. Aug 27, 2014(28):Drive chain adjuster position moved <Verification> SMC could not find a clear reason why adjuster breakage was only happening on subject GSX-R750/1000 models because the measured force value from extreme mis-shifting of other models also exceeded the strength of the chain adjuster, but breakage of the chain adjuster did not occur.
August - September, 2014	<Impact testing> SMC had been measuring the strength of the adjuster using static force but considered that the strength may be different during impact testing. SMC asked an outside experimental organization to conduct impact testing to evaluate this possibility. The testing results showed that the load capacity of the chain adjuster is almost the same in the static condition and in the dynamic condition.
September, 2014	SMC received three FTIRs from the U.S. distributor. Sep 9, 2014(29):Drive chain adjuster position moved Sep 9, 2014(30):Drive chain adjuster position moved Sep 12, 2014(31):Drive chain adjuster position moved <Reproduction test with a new clutch> SMC conducted testing with a new clutch to assess whether use of a new clutch adversely affected the force applied to the chain adjuster because most users that experienced chain adjuster damage did not have the same problem in the future. The testing showed that the shock force from mis-shifting was almost the same for the new clutch as for a used clutch. <Reproduction test with a different sprocket> SMC measured the force of shock after mis-shifting

	with various drive/driven sprockets because the number of sprocket teeth was different for different models. The testing showed that the shock forces from mis-shifting was almost the same among all of the tested sprockets. <Force measurement No. 3> Nine different models were tested by riding at 60 km/h in neutral, revving the engine to approximately 75% of the maximum rpm for each model, and shifting to 2nd gear from neutral with the clutch engaged. The shock forces after mis-shifting for the subject GSX-R750/1000 motorcycles exceeded the strength of the chain adjuster while the shock forces for the other models also exceeded the strength of the chain adjuster. <Verification> The SMC motorcycle design team recognized that the first measured value of generated force from extreme mis-shifting was invalid based on the advice from a stress analysis specialist. SMC investigated the valid measurement force and found that the forces of shock after mis-shifting when excluding the first measured value exceeded the strength of chain adjuster for the subject GSX-R750/1000 motorcycles while other tested models did not show this result. SMC could finally find a clear reason to explain why the problem was only happening on subject GSX-R750/1000 models. <Verification of chain adjuster breakage> SMC conducted chain adjuster breakage tests on 9 models using the procedure described above. Only the chain adjusters for the subject GSX-R750/1000 motorcycles broke. <Judgment> Suzuki judged that the shock generated by upshifting at high engine rpm without disengaging the clutch after mis-shifting is the possible main cause of chain adjuster breakage on some GSX-R750/1000 motorcycles.
September 18, 2014	SMC's Quality Assurance Committee met to discuss cases (17) and (20) - (31) and decided to refer the

	issue to SMC's Quality Countermeasure Committee.
September 26, 2014	Suzuki decided to conduct a safety recall to address the issue.