



Your Ref: 1756228826SG
Our Ref : CI/AIG18022608/N

14 December 2018

M/s AIG Asia Pacific Insurance Pte. Ltd.
78 Shenton Way #08-16
CHARTIS Building
Singapore 079120
(Motor Claims Department)

**TECHNICAL INVESTIGATION REPORT OF FIRE INCIDENT INVOLVING THE
INSURED VEHICLE SGY 1669A ON 28 NOVEMBER 2018**

1. We refer to your letter dated 10 December 2018 and the instructions therein.
2. Our analysis, comments and opinions with respect to the cause of fire to the Motor Vehicle SGY 1669A (herein referred to as "**Insured Vehicle**") are set out below.

Inspection of the Motor Vehicle

3. The Insured Vehicle was physically inspected on 12 December 2018 at the premises of Edge Tech located at 176 Sin Ming Drive #05-08, Singapore 575721.
4. A static inspection was carried out to the Insured Vehicle where the following general information was recorded:-

Vehicle Registration No.	: SGY 1669A
Make / Model	: SUBARU 2.5 WRX
Chassis No	: JF1GDGKD37G071365
Year of Registration	: Sep 2007
Mileage	: N.A (battery melted)
5. The exterior front body and interior compartment of the Insured Vehicle sustained visible fire damage. This included its front windscreen, front bonnet, headlights, front bumper, side panels, front rims and front tires.
6. The fire had resulted in extensive damage to the engine compartment of the Insured Vehicle. Most of the components inside the engine compartment were found to be severely burnt and/or melted as a result of the fire. See photos 1 – 8 below.



Photo 1 shows the general view of the rear left body of the Insured Vehicle at the time of our inspection. The rear portion of the Insured Vehicle was observed to be unaffected by the fire.



Photo 2 shows the general view of the front portion of the Insured Vehicle at the time of our inspection. The exterior body of the Insured Vehicle had sustained visible fire damage. This included its front windscreen, front bonnet, headlights, front bumper, side panels, front rims and front tires.



Photo 3 shows the general view of the left portion of the Insured Vehicle at the time of our inspection. The exterior body of the Insured Vehicle had sustained visible fire damage. This included its front windscreen, front bonnet, left headlight, front bumper, left side panel, left front rim and left front tire.



Photo 4 shows the general view of the right portion of the Insured Vehicle at the time of our inspection. The exterior body of the Insured Vehicle had sustained visible fire damage. This included its front windscreen, front bonnet, right headlight, front bumper, right side panel, right front rim and right front tire.



Photo 5 shows a closer view of the front windscreen of the Insured Vehicle at the time of our inspection. The front windscreen had sustained serious fire damage.



Photo 6 shows the interior compartment of the Insured Vehicle at the time of our inspection. The interior compartment of the Insured Vehicle was relatively unaffected by the fire, except for the left portion.



Photo 7 shows a closer view of the lower left portion of the Insured Vehicle's interior compartment at the time of our inspection which was significantly affected by the fire (circled).



Photo 8 shows a general view of the engine compartment of the Insured Vehicle at the time of our inspection. Most of the components inside the engine compartment were found to be severely burnt and/or melted as a result of the fire.

7. At the time of physical inspection of the Insured Vehicle, we had found several modifications and additionally fitted electronic and/or electrical component(s) on the Insured Vehicle. These included an aftermarket steering wheel, aftermarket front seats, aftermarket gauges together with a controller console, actuator valve controller, turbo timer, an aftermarket water injection system for the inter-cooler, 2 aftermarket twitters (which had sustained serious fire damage), 4 aftermarket speakers, an active subwoofer, an aftermarket in-car DVD player (which had sustained minor fire damage), engine strut bar (which had sustained serious fire damage), rear strut bar, aftermarket 18- inch alloy rims and a non- standard rear exhaust muffler. All these fitted components were not the standard type for the Insured Vehicle. See photos 9 - 31 below.



Photo 9 shows the aftermarket steering wheel fitted onto the Insured Vehicle upon our inspection. The brand of the steering wheel was 'MOMO' (circled).



Photo 10 shows the aftermarket front seats (red arrows) that were fitted onto the Insured Vehicle upon our inspection.



Photo 11 shows the aftermarket gauges (circled) that were found to be additionally fitted onto the Insured Vehicle upon our inspection.



Photo 12 shows the controller console for the aftermarket gauges (circled) that was found to be additionally fitted onto the Insured Vehicle upon our inspection. The brand of the controller console was 'DEFI' (circled).



Photo 13 shows the actuator valve controller that was found to be additionally fitted onto the Insured Vehicle upon our inspection. The brand of the controller was 'APEXI' (circled).



Photo 14 shows the turbo timer that was found to be additionally fitted onto the Insured Vehicle upon our inspection.



Photo 15 shows the controller for the water injection system that was found to be additionally fitted under the steering wheel of the Insured Vehicle upon our inspection (circled).



Photo 16 shows a close up view of the controller for the water injection system that was found to be additionally fitted under the steering wheel of the Insured Vehicle upon our inspection. The brand of the controller was 'AEM' (circled).



Photo 17 shows the water tank and motor for the water injection system that was found to be additionally fitted at the left portion of the Insured Vehicles' rear boot compartment upon our inspection (circled).



Photo 18 shows the 1st aftermarket twitter fitted onto the right corner of the dashboard of the Insured Vehicle upon our inspection which had sustained minor fire damage (circled).



Photo 19 shows the 2nd aftermarket twitter fitted onto the left corner of the dashboard of the Insured Vehicle upon our inspection which had sustained serious fire damage (circled).



Photo 20 shows the aftermarket active subwoofer fitted under the front passenger seat of the Insured Vehicle upon our inspection.



Photo 21 shows a close up view of the aftermarket active subwoofer fitted under the front passenger seat of the Insured Vehicle upon our inspection.



Photo 22 shows the in-car DVD player that was fitted at the centre portion of the front dashboard of the Insured Vehicle which had sustained minor fire damage. The brand of the in-car DVD player was 'PIONEER' (circled).



Photo 23 shows the 1st aftermarket speaker fitted at the front passenger door panel (circled).



Photo 24 shows the 2nd aftermarket speaker fitted at the driver door panel (circled).



Photo 25 shows the 3rd aftermarket speaker fitted at the left rear passenger door panel (circled).



Photo 26 shows the 4th aftermarket speaker fitted at the right rear door panel (circled).



Photo 27 shows the engine strut bar (circled) fitted on the Insured Vehicle. However it had sustained serious fire damage.



Photo 28 shows the rear strut bar (circled) fitted onto the rear boot compartment of the Insured Vehicle. The rear strut bar was found to be relatively unaffected by the fire.



Photo 29 shows the non-standard rim found to be fitted on the Insured Vehicle at the time of our inspection. The 18- inch alloy rims fitted on the Insured Vehicle were not the standard type for the Insured Vehicle.



Photo 30 shows a front view of the non-standard rear exhaust muffler that was found to be fitted on the Insured Vehicle at the time of our inspection.



Photo 31 shows a close up side view of the non-standard rear exhaust muffler that was found to be fitted on the Insured Vehicle at the time of our inspection. The brand of the rear exhaust muffler was 'HKS' (circled).

Investigation and Technical Analysis

8. For this particular case, the fire appears to have originated within the engine compartment of the Insured Vehicle, somewhere around the left rear portion of the engine compartment due to the nature of the fire damage which was more extensive at the left rear portion. Furthermore, the intense whitish burn marks on the left front fender and hole found in the front bonnet of the Insured Vehicle indicate that the front left portion of the Insured Vehicle was exposed to prolonged high heat intensity. The right front fender had sustained minimal fire damage. Following the characteristic of heat (hot air rises), the origin of fire can then be determined to be from the engine compartment of the Insured Vehicle as the engine compartment is covered by the front bonnet and front fenders. Flames from the confined spaces of the engine compartment would travel outwards and upwards, exposing the front bonnet and front fenders of the Insured Vehicle to high heat intensity hence leaving a hole in the front bonnet as seen.
9. The whitish burn marks are a result of exposure to prolonged heat intensity. Rust would normally start to develop around these areas soon after a fire as prolonged exposure to high heat intensity usually causes steel/metal material body parts to be exposed to natural environmental condition. The rust that had developed on the left rear portion of the engine compartment is an indication that the left rear portion of the engine compartment had sustained exposure to prolonged high heat intensity. See photos 32 - 35 below.



Photo 32 shows the hole found in the front bonnet of the Insured Vehicle which indicates that the front portion of the Insured Vehicle was exposed to prolonged high heat intensity. The whitish burn marks (arrowed) are a result of exposure to prolonged heat intensity.



Photo 33 shows a closer view of the rust that had developed on the left rear portion of the engine compartment (circled). The development of rust is an indication that this area was subjected to prolonged exposure to high heat intensity, which had caused the steel/metal material of the front bonnet to be exposed to natural environmental condition. Hence the fire to the Insured Vehicle can be determined to have originated towards the left rear portion of the engine compartment.



Photo 34 shows the whitish burn marks that were found on the left front fender of the Insured Vehicle (circled). Such whitish burn marks are a result of exposure to prolonged heat intensity, which may indicate where the fire had started. Rust would also begin to develop on these areas soon after the fire.



Photo 35 shows the right front fender of the Insured Vehicle which had sustained minimal fire damage.

10. Upon closer examination of the left rear portion of the engine compartment which was where the fire to the Insured Vehicle had likely started, we had found several stretches of wirings with greenish residue. These wirings were original factory fitted wirings that were mainly around the left rear portion of the engine compartment. The presence of greenish residue indicates internal heating of copper wires, a sign of an electrical short circuit occurring. The greenish residue is normally left behind from oxidation as a result of chemical reaction involving the copper wires. This physical evidence would appear to suggest that the cause of fire to the Insured Vehicle could have possibly been due to electrical in nature. See photos 36 – 40 below.



Photo 36 shows the wirings around the left rear portion of the engine compartment which is near to the vicinity where the fire to the Insured Vehicle had likely started. We observed greenish residue on the wirings at the left rear portion of the engine compartment (circled). The presence of greenish residue indicates internal heating of copper wires, a sign of an electrical short circuit occurring. The greenish residue is normally left behind from oxidation as a result of chemical reaction involving the copper wires.



Photo 37 shows a closer view the greenish residue on the wirings at the left rear portion of the engine compartment (yellow arrows). The presence of such greenish residue suggests occurrence of an electrical short circuit.



Photo 38 shows a close up view of the greenish residue on the wirings (yellow arrows) at the left rear portion of the engine compartment. The presence of such greenish residue suggests occurrence of an electrical short circuit.



Photo 39 shows a close up view of the greenish residue on the wirings (arrowed) at the left rear portion of the engine compartment arrows). The presence of such greenish residue suggests occurrence of an electrical short circuit.



Photo 40 shows a close up view of the greenish residue on the wirings (arrowed) at the left rear portion of the engine compartment. The presence of such greenish residue suggests occurrence of an electrical short circuit.

11. From the Singapore Accident Statement, which was made by Mr Poh Jun Wen, Gerald (herein referred to as "**Mr Poh**"), we note that the fire to the Insured Vehicle had started at a time when he was driving. Mr Poh was first alerted of a strong smell of petrol within the interior compartment of the Insured Vehicle.
12. We managed to speak to Mr Poh on 14 December 2018 where we were able to gather further information pertaining to the incident as well as information pertaining to the history of the Insured Vehicle.
13. According to Mr Poh, at about 0300hrs on 28 November 2018 he had left his home located at Bukit Batok West Avenue 8 and was headed to Block 328 Clementi Avenue 3 to buy fish food. Mr Poh entered PIE (Changi) and exited at Clementi Avenue 6. As he approached the T- junction of Clementi Avenue 6 and Clementi Loop, he detected a strong smell of petrol within the interior compartment of the Insured Vehicle. He quickly turned right into Clementi Loop. He subsequently made another left turn but before he could stop the Insured Vehicle, he saw flames emitting from the left portion of the front bonnet.
14. Mr Poh immediately switched off the engine and opened the front bonnet. He grabbed a fire extinguisher from the front passenger compartment and attempted to put out the fire but by then the fire was too big. An EMAS personnel who was nearby rushed to the Insured Vehicle, took a fire extinguisher from his vehicle and tried to extinguish the fire while Mr Poh called the SCDF.
15. The SCDF deployed 2 fire bikes and 2 pumpers which arrived in less than 10 minutes followed by the police. Firefighters took less than 5 minutes to put out the fire. The police then took Mr Poh's statement and he also assisted the SCDF in their preliminary investigations. The SCDF fire investigator allowed Mr Poh to tow the Insured Vehicle after approximately 1 and a half hours. Mr Poh called his insurance broker and informed him of the incident. Mr Poh then called James Towing. The tow truck arrived about an hour later. Mr Poh hitched a ride with the towing personnel and the Insured Vehicle was towed to Edge Tech. Mr Poh's friend then came to pick him up. Mr Poh made an insurance report later that same day at Lai Huat Motor Pte. Ltd. on 29 November 2018 at 1211 hours.
16. With regards to the history of the Insured Vehicle, we were able to gather from Mr Poh that the Insured Vehicle was purchased second hand from a direct owner 2 years ago. Mr Poh renewed the COE for another 10 years on 18 September 2017. He is the owner and main driver of the Insured Vehicle.

17. We asked Mr Poh regarding the aftermarket steering wheel, aftermarket front seats, aftermarket gauges together with a controller console, actuator valve controller, turbo timer, aftermarket water injection system for the inter-cooler, 2 aftermarket twitters, 4 aftermarket speakers, active subwoofer, aftermarket in-car DVD player, engine strut bar, rear strut bar, aftermarket 18-inch alloy rims and non-standard rear exhaust muffler. He mentioned that the aftermarket gauges together with the controller console, actuator valve controller, turbo timer, aftermarket water injection system for the inter-cooler, 2 aftermarket twitters, 4 aftermarket speakers, active subwoofer, engine strut bar, rear strut bar, aftermarket 18-inch alloy rims and non-standard rear exhaust muffler were already fitted onto the Insured Vehicle when he purchased it.
18. He replaced the steering wheel, front seats and in-car DVD player with aftermarket components. As for the after-market rear exhaust muffler, Mr Poh was able to provide us with the exhaust authentication certificate as well as the inspection acknowledgement letter issued by the LTA to prove that the after-market rear exhaust muffler had passed inspection on 12 June 2012. See photos 41 & 42.

JASMA 日本自動車マフラー協会 登録認定書

製品番号: 20071002 部品番号: 3000-0200 製品名: 排気マフラー 寸法: 1.00

車種: スバル インプレッサ 製造年: 2005 製造国: 日本

登録番号: 0001002 部品名: 排気マフラー 寸法: 1.00

12月12日

上記製品に対するお問い合わせ窓口
お問い合わせ先: 03-344-2211

12月12日

日本自動車マフラー協会
〒100-0001 東京都千代田区千代田 1-1-1

車種	年式	型式	エンジン	排気量	燃費	備考
スバル	インプレッサ	2005	2.0L	1600cc	18.0km/L	

Photo 41 shows the HKS rear exhaust muffler authentication certificate. The rear exhaust muffler was fitted onto the Insured Vehicle (arrowed) on 12 June 2012 and had passed inspection on the same date (circled).

Land Transport Authority

12 Sin Ming Drive Singapore 575701
Hotline: 7830 - CALL 1 TA (1800-2255 580)
FAX: (65) 6553 5229

Date: 12 JUN 2012

VIR No.: 20120612469550

Mr/Ms/Madam
NG YU SUI
APT BLK 103 SERANGOON NORTH AVENUE 1
#10-769
SINGAPORE 540103

Dear Mr/Madam,

INSPECTION ACKNOWLEDGEMENT LETTER

EXHAUST SYSTEM

Vehicle Registration No: 8G2V1669A
Chassis No: JF1GDKKD37G071365
Engine No: EJ25D120089
Applicant: NG YU SUI

This is to acknowledge that your vehicle has passed the inspection on 12 JUN 2012.

The accessory details are as follows:

Make: HKS
Model Name: HKS
EUC/CE/JASMA/IMCA Number: 0
Type Number: 31006-CT001

Thank you for presenting the above vehicle for inspection.

Register of Vehicles



VIR 1004 (1st Stage) 1004 (1st Stage) Singapore 129118

1004 (1st Stage)

Photo 42 shows the inspection acknowledgement letter issued by the LTA to prove that the HKS rear exhaust muffler fitted onto the Insured Vehicle (red arrows) had passed inspection on 12 June 2012 (circled).

19. Pertaining to the maintenance aspect, Mr Poh mentioned that he sends the Insured Vehicle for periodic servicing. He services the Insured Vehicle at Edge Tech. Mr Poh mentioned that he had underwent the LTA mandatory yearly vehicle inspection in July 2018 where he was informed by the inspection personnel that the engine number of the Insured Vehicle was not for the make and model of the Insured Vehicle. The Insured Vehicle had therefore failed the inspection and Mr Poh was interviewed by a LTA investigation officer. Mr Poh was informed that he could either purchase a new engine for the same make and model as the Insured Vehicle or he had to scrap the Insured Vehicle.

Incident Scene Photographs

22. We were able to obtain photographs which were taken by Mr Poh at the incident location. The photographs were taken during and after the fire to the Insured Vehicle was extinguished.

23. In general, the information that could be gathered from these photographs had corresponded to the events that were related to us by Mr Poh. Our close examination of these photographs also showed no unusual foreign material(s) and/or object(s) found on the ground in the immediate area of the road where the Insured Vehicle was positioned. See photos 43 & 44 below.



Photo 43 shows the Insured Vehicle on fire before the arrival of the SCDF. In general, the information that could be gathered from this photograph had corresponded to the events that were related to us by Mr Poh, which is the fire started from the front bonnet.



Photo 44 shows a firefighter making sure that the fire had been completely extinguished (arrowed). In general, the information that could be gathered from this photograph had corresponded to the events that were related to us by Mr Poh, which is the police (circled) and SCDF were present at the incident location.

24. Based on the vehicle service record invoices provided, we are of the opinion that it is unlikely that the fire could have been caused by poor maintenance of the Insured Vehicle.
25. Given the circumstances of incident as reported, the possibility of the cause of fire to the Insured Vehicle being due to engine overheating would seem unlikely as Mr Poh had mentioned to us there were no indications of abnormally high temperatures on the Insured Vehicle. Moreover, an overheated engine would have caused the Insured Vehicle to stall. However in this case, Mr Poh was the one who noticed flames emitting from the left portion of the front bonnet while he was driving and stopped the Insured Vehicle. Therefore, we are of the opinion that the fire was not caused by an overheated engine.
26. The possibility of the fire being due to external factors (foreign material(s) stuck on hot surfaces, arson and sabotage amongst others) would also seem unlikely given that our examination of the available incident scene photographs did not reveal any unusual material(s)/object(s) found on the road near where the Insured Vehicle was positioned. The location of where the Insured Vehicle was positioned was also observed to be not at a secluded location.

27. The possibility of the fire being due to electrical in nature would then seem more likely given that engine overheating and external factors would both seem unlikely. The fire being due to electrical in nature is also supported by the burnt wirings found in the engine compartment of the Insured Vehicle, which was earlier discussed in paragraph 10 above.
28. Our checks with both local and international bodies and associations revealed that at the time of writing this report, there is no manufacturer recall of similar make and model vehicle as the Insured Vehicle that may possibly be related to this incident. However there was a previous recall campaign involving the Insured Vehicle on 21 May 2015. The purpose of the recall was for the Takata airbag inflators. However the issue was not rectified at the time of writing this report.


Enquiry on Vehicle Recall - Vehicle Specific

* ONLY INFORMATION ON VEHICLE RECALLS SUBMITTED FROM 9 APRIL 2007 IS AVAILABLE

Vehicle Owner Particulars	
Owner ID Type	Singapore NRIC
Owner ID	4453E

Vehicle Details	
Vehicle Registration Number	SDY1699A
Make	Subaru
Vehicle Model	2.5 WRX
Engine No.	EJ25201145
Chassis No.	JF100CK1D70071965

Recall Details	
Recall No.	42053076133
Manufacturer Recall Date	21 May 2015
Estimated Completion Year of Recall	2017
Brief Description (as Provided to Motor Dealers)	<p>The subject vehicles are equipped with front passenger air bag (SRS) inflators, which are described in Part 5.7.2 Defect Information Report (DAITSA) Report No. 120-04-1) issued by Takata on May 18, 2015. The problem is a failure of the subject inflator's main initiator to function over time, which could potentially lead to over-activation in the event of an air bag deployment. Takata is aware of a potential issue associated with the inflator body internal base valve on some SRS inflators. During its investigation, Takata observed a small no. of base seal leaks in SRS inflators manufactured prior to 2007. These leaks were discovered during leak testing in 2004, as part of the Takata internal inflator evolution program. Leaks have been found in SRS inflators returned from several of the vehicle manufacturers. Such leaks can increase the potential for moisture to reach the main propellant wafers. In the event of a crash necessitating deployment of the passenger side front air bag, the subject inflator's wafers could cause the inflator to rupture with fragments on fire and potentially injure or kill the vehicle occupants.</p>

Date Rec'd: 

For more details, contact MOTOR IMAGE ENTERPRISES PTE LTD

Mobile Information: SUBARU SERVICE CENTRE TOA PAYOH
BRANCH 468700101
SUBARU SERVICE CENTRE LENOVA
BRANCH 468700102



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Conclusion

29. Having investigated and technically analysed the damages of burnt nature to the Insured Vehicle, we are of the view that the cause of fire to the Insured Vehicle was of electrical in nature. For this particular case, the fire had originated along the wirings inside the engine compartment, somewhere around the left rear portion of the engine compartment. The wirings were original factory wirings of the Insured Vehicle. The electrical short circuit may have been caused by a fuel leak from the fuel pump. The excess fuel may have come into contact with exposed wirings which had current running through them as earlier discussed in paragraph 27 above. This may have triggered the electrical short circuit.
30. We did not find any evidence which had suggested that the cause of fire to the Insured Vehicle was due to poor maintenance and/or recurring electrical problem.
31. We found the Insured Vehicle to be fitted with additional electrical/electronic components which included aftermarket gauges together with a controller console, actuator valve controller, turbo timer, aftermarket water injection system for the inter-cooler, 2 aftermarket twitters, 4 aftermarket speakers, active subwoofer and aftermarket in-car DVD player. The abovementioned electrical/electronic components do not require prior approval from LTA.
32. We are further of the view that the additionally fitted electrical/electronic components found on the Insured Vehicle could not have possibly caused overloading to the electrical system of the Insured Vehicle considering that the installation was carried out a few years prior to the fire incident.

33. We found the Insured Vehicle to be fitted with an aftermarket steering wheel, aftermarket front seats, non- standard engine and rear strut bars, aftermarket 18-inch alloy rims and a non- standard rear exhaust muffler. The engine strut bars and tyre rims fitted do not require prior approval from LTA however the non-standard rear exhaust muffler would require prior approval from LTA. Mr Poh has provided documents to prove that the non-standard rear exhaust muffler has been approved by the LTA.
34. Although the aftermarket steering wheel, aftermarket front seats, engine strut bars, aftermarket alloy rims and rear exhaust muffler fitted on the Insured Vehicle were not the standard type for the Insured Vehicle, we are of the view that these parts did not cause and/or contribute to the fire incident.
35. Our investigations had also revealed that at the time of writing this report, there is no manufacturer recall of electrical nature to similar make and model vehicle as the Insured Vehicle that may possibly be related to this incident.



Muhd Nazril
Technical Investigator



Ang Bryan Tani
AMSOE, AMIRTE, AFF SAE, M MATAI, AFF Inst AEA
Senior Technical Investigator
Technical Investigation & Reconstructionist (SAE-A)

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