

Your Ref : D18004798-LJ
Our Ref : CI/FCI18013191/N

29 June 2018

M/s First Capital Insurance Limited
36 Robinson Road #16-01
City House
Singapore 068877

**TECHNICAL INVESTIGATION REPORT OF FIRE INCIDENT INVOLVING THE
INSURED VEHICLE SHC 7200H ON 15 JUNE 2018**

1. We refer to your letter dated 25 June 2018 and the instructions therein.
2. Our analysis, comments and opinions with respect to the cause of fire to the insured vehicle SHC 7200H (herein referred to as "**Insured Vehicle**") are set out below.

Inspection of the Insured Vehicle

3. The Insured Vehicle was physically inspected on 27 June 2018 at the premises of ComfortDelGro Engineering Pte. Ltd. (herein referred to as "**CDGE**") located at 59 Loyang Drive, Singapore 508969. A static inspection was carried out to the Insured Vehicle where the following general information was recorded:-

Vehicle Registration No.	: SHC 7200H
Make / Model	: HYUNDAI I40 1.7L CRDI AT ABS AIRBAG 4DR
Chassis No	: KMHLB41UMGU088852
Year of Registration	: April 2016
Mileage	: N.A. (battery melted)

4. The Insured Vehicle was observed to have sustained severe fire damage all around. Its engine compartment and interior compartment were completely burnt. Rust had accumulated all over the Insured Vehicle as a result of exposure to environmental condition for a period of time. See photos 1 – 5 below.



Photo 1 shows the general view of the front portion of the Insured Vehicle at the time of our inspection. The Insured Vehicle was observed to have sustained extensive fire damage all around. Its engine compartment and interior compartment were completely burnt. Rust had accumulated all over the Insured Vehicle as a result of exposure to environmental condition for a period of time.



Photo 2 shows the general view of the left body of the Insured Vehicle at the time of our inspection. The Insured Vehicle was observed to have sustained extensive fire damage all around. Rust had accumulated all over the Insured Vehicle as a result of exposure to environmental condition for a period of time.



Photo 3 shows the general view of the rear right body of the Insured Vehicle at the time of our inspection. The Insured Vehicle was observed to have sustained extensive fire damage all around. Rust had accumulated all over the Insured Vehicle as a result of exposure to environmental condition for a period of time.



Photo 4 shows the general view of the interior compartment of the Insured Vehicle at the time of our inspection. Its interior compartment was completely burnt as a result of the fire.



Photo 5 shows the engine compartment of the Insured Vehicle at the time of our inspection. The entire engine compartment of the Insured Vehicle was observed to be severely burnt. Most of the parts inside the engine compartment were found to be burnt and/or melted as a result of the fire.

5. At the time of inspection, we did not find any unusual skeletal remains which could have suggested that there was possible modification(s) on the Insured Vehicle.

Investigation and Technical Analysis

6. For this particular case, the fire appears to have originated within the engine compartment of the Insured Vehicle, somewhere around the rear left portion of the engine compartment. This can be determined from the burn pattern and the high heat intensity burn marks (whitish burn marks) as well as the rust that had developed on the underside of the front bonnet, at the bottom left portion of the Insured Vehicle.
7. 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 underside of the front bonnet, around the bottom left portion, is an indication that the rear left portion of the engine compartment had sustained exposure to prolonged high heat intensity. See photo 6 below.



Photo 6 shows the rust that had developed on the underside of the front bonnet, around the bottom left portion (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 rear left portion of the engine compartment.

8. Upon closer examination of the rear left portion of the engine compartment, which was where the fire to the Insured Vehicle had likely started, we had found greenish residue on several burnt stretches of original factory fitted wirings around the rear left portion of the engine compartment. The presence of such 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 then appear to suggest that the cause of fire to the Insured Vehicle could have possibly been due to electrical in nature. See photos 7 - 10 below.



Photo 7 shows the original factory fitted wirings around the rear left portion of the engine compartment, which is in the immediate vicinity where the fire to the Insured Vehicle had likely started. We had found greenish residue on several burnt stretches of these wirings (circled). The presence of such 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 8 shows a closer view of the greenish residue found on some of the burnt stretches of original factory fitted wirings (arrowed). The presence of such greenish residue suggests occurrence of an electrical short circuit.



Photo 9 shows a close up view of the greenish residue found on some of the burnt stretches of original factory fitted wirings (arrowed). The presence of such greenish residue suggests occurrence of an electrical short circuit.



Photo 10 shows a close up view of the greenish residue found on some of the burnt stretches of original factory fitted wirings (arrowed). The presence of such greenish residue suggests occurrence of an electrical short circuit.

9. From the Singapore Accident Statement, which was made by Mr Soh Choon Seng (herein referred to as "**Mr Soh**"), we note that the fire to the Insured Vehicle had started at a time when he was driving. Mr Soh was first alerted of the fire when he saw thick white smoke coming out of the front bonnet of the Insured Vehicle.
10. We managed to speak to Mr Soh on 29 June 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.
11. According to Mr Soh, he had picked up a male passenger from the Singapore Changi Airport at 0500 hours and was headed to 10A Sophia Road. He travelled along the ECP and took the Rochor Road exit. He was driving along Adis Road and was going to make a left turn up ahead into Sophia Road when he saw thick white smoke coming out of the left side of the Insured Vehicle's front bonnet. The Insured Vehicle was spotted by police officers who were on patrol in the area and they signalled Mr Soh to stop the Insured Vehicle.
12. He quickly stopped the Insured Vehicle in front of Sophia Hills before the filter lane into Sophia Road. He switched off the engine and told the passenger to exit the Insured Vehicle. He took the passenger's luggage out from the boot when he saw a fire had broken out at the front bonnet. The police called for the SCDF. The SCDF arrived within 15 minutes. Mr Soh contacted ComfortDelGro to report the incident. Firefighters took about 10 minutes to put out the fire. The police questioned Mr Soh post- incident. He also assisted the SCDF in their preliminary investigations.
13. The tow truck arrived nearly 3 hours post- incident. The Insured Vehicle was towed to CDGE. Mr Soh hitched a ride with the towing personnel to Opel Road where he then alighted and took a cab back home. Mr Soh went to CDGE the next day on 16 June 2018 and made the insurance report at 1205 hours.
14. With regard to the history of the Insured Vehicle, we were able to gather from Mr Soh that he was the relief driver for the hirer who went on holiday. He would normally drive in the mornings for about 7 to 8 hours. To the best of his recollection, there was no mechanical or electrical/electronic problem with the Insured Vehicle.
15. Mr Soh also told us that he neither noticed any warning lights nor abnormally high temperatures while he was driving the Insured Vehicle.

Site Inspection

16. With the information gathered, we visited the incident location on 4 July 2018 taking the report made by Mr Soh and the information that we had gathered from him as references.
17. Firstly, we note that the incident had occurred along Adis Road in front of Sophia Hills before the filter lane into Sophia Road.
18. At the time of our visit, we observed burn marks and/or burnt residual remains on the ground as well as on the kerb and drain grating nearest to where the Insured Vehicle was positioned when the fire occurred. We also observed that the adjacent warning signs, lamp post, electrical fixtures and a tree were affected by the fire. A part of the road where the Insured Vehicle was positioned when the fire broke out was repaved. The Belisha beacon closest to the Insured Vehicle was replaced. We did not observe any other damaged or newly replaced government property at the time of our visit to the incident location. See photos 11 – 18 below.



Photo 11 shows Adis Road in front of Sophia Hills before the filter lane into Sophia Road where the incident occurred (circled).



Photo 12 shows the burn marks and/or burnt residual remains on the ground before the filter lane into Sophia Road where the incident occurred (arrowed).



Photo 13 shows the burn marks and/or burnt residual remains on the ground, kerb, electrical fixtures and drain grating nearest to where the Insured Vehicle was positioned when the fire occurred (arrowed).



Photo 14 shows a closer view of the damage observed on the adjacent electrical fixtures. The paint is discoloured and flaky (red arrows). Bubbles have also formed on the warning and information signs due to exposure to prolonged high heat intensity from the fire (circled).



Photo 15 shows the remains of a tree which was affected by the fire.



Photo 16 shows the lamp post which was affected by the fire.



Photo 17 shows the repaved part of the road where the Insured Vehicle was positioned when the fire broke out.



Photo 18 shows the replaced Belisha beacon closest to the Insured Vehicle which was affected by the fire (arrowed).

19. Upon closer examination of the surrounding area, we noticed 2 CCTV cameras nearest to the incident location that belong to Black & White Laundry Services (herein referred to as "BWLS").
20. Since there were 2 CCTV cameras positioned in the vicinity belonging to BWLS in close proximity to where the Insured Vehicle was positioned, we managed to speak to its owner Ms Joey. She informed us that the shop was not opened on that day as it was a public holiday. She was informed by her tenant who rents the space upstairs that there had been a vehicular fire directly opposite of the shop at around 0600 hours.
21. We inspected the premises of BWLS. The CCTV cameras were positioned on the ceiling at the front of the shop. The angles of the cameras are such that they are facing the entrance of the shop and out of range of the incident location. Hence the cameras would have been unable to record any footage of the incident from those angles. We managed to take photographs of the CCTV cameras. See photos 19 & 20 below.



Photo 19 shows 1 of 2 CCTV cameras nearest to the incident location (circled) that belong to BWLS.



Photo 20 shows the position of BWLS's 2 CCTV cameras (circled). The CCTV cameras were positioned on the ceiling at the front of the shop. The placements of the cameras are such that they are facing the entrance of the shop and out of range of the incident location. Hence the cameras would have been unable to record any footage of the incident from those angles.

Incident Scene Photographs

22. We were able to obtain from Mr Soh several photographs of the Insured Vehicle which were taken after the fire had been extinguished. In general, the information that could be gathered from these photographs had corresponded to the events that were related to us by Mr Soh. 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 before the filter lane where the Insured Vehicle was positioned. See photos 21 & 22 below.



Photo 21 shows the SCDF making sure that the fire had been completely extinguished.



Photo 22 shows the Insured Vehicle after the fire was extinguished. In general, the information that could be gathered from this photograph had corresponded to the events that were related to us by Mr Soh, which is the police were also present at the incident scene (arrowed).

23. Pertaining to the maintenance aspect, the Insured Vehicle is serviced at a ComfortDelGro workshop located in Braddell Road.
24. During the course of our investigations, we were also able to obtain from Mr Lim Tien Song, who is a service advisor at CDGE, documents relating to the servicing of the Insured Vehicle for the past 3 months. We noted that the Insured Vehicle was brought in for repair works on 12 May 2018, as an issue with the engine was reported. The alternator and engine mounting were changed. See Invoice 1 below.

Date: 27.06.2018

TAXI SERVICE HISTORY

Time: 11:04:44

Taxi Nos: SHC7200H ← Model: I-40

Reg Date: 21.04.2016

Workshop: BL

Serviced on: 12.05.2018 / 09:00:00 ← Time Out: 12.05.2018 / 13:49:35
Remarks: (Engine Noisy)

Job Card Nos: 602803111

Type: JC

Odometer Reading:

391,031

PM/PROBLEM REPORTED

8.0 Mechanical Team Repair - Maran A/L Ravari Kowandan

8.1 Engine Noisy

QC QC TEST BY LAT

- Chong Soon Fatt

MATERIAL CHANGED

SN	DESCRIPTION	QTY
1	I40V2 ALTERNATOR ASSY - RECON	1.000 EAC
2	I40VC BRACKET ASSY-ENGINE MTG	1.000 EAC

REMARKS

SN DESCRIPTION

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Invoice 1 shows the repair works done on 12 May 2018 (arrowed). An issue with the engine of the Insured Vehicle was reported (circled). The alternator and engine mounting were changed.

25. The Insured Vehicle was brought in for repairs on 18 May 2018 as the hirer had reported experiencing a loss of power and jerky gear shifting when driving the Insured Vehicle. The brake assembly and brake fluid were changed. See Invoice 2 below.

Serviced on: 18.05.2018 / 06:20:00 ← Time Out: 18.05.2018 / 11:55:40
Remarks: (AUTO HOLD LIGHT ON)
Job Card Nos: 602806914 Type: JC Odometer Reading: 394,213

PM/PROBLEM REPORTED

BRKD BREAKDOWN
6.0 Mechanical Team Repair - Kanapati Arumugam
6.5 ~~REPAIRING BACKLIGHT~~ [
AUTO HOLD LIGHT ON and loss power and gear jerky]
QC QC TEST BY IAT Tong Men Seng

MATERIAL CHANGED

SN	DESCRIPTION	QTY
1	I40VC SW ASSY-EPB	1.000 EAC
2	I40V2 BRAKE ASSY-RR WHEEL RH	1.000 EAC
3	(ALL) BRAKE CLUTCH DOT4 (1L BOT)	1.000 L
4	HYUNDAI WHEEL NUT	1.000 EAC
5	HYUNDAI WHEEL STUD	1.000 EAC
6	I40VC LIFTER-HOOD RH	1.000 EAC
7	I40VC LIFTER-HOOD LH	1.000 EAC

Invoice 2 shows the repairs done on 18 May 2018 (arrowed) as the hirer had reported experiencing a loss of power and jerky gear shifting when driving the Insured Vehicle. The brake assembly and brake fluid were changed.

26. The Insured Vehicle was last serviced on 14 June 2018, a day before the incident occurred. An issue of similar nature pertaining to the engine and undercarriage were reported. The servicing package had included the changing of engine oil, oil filter and auto transmission fluid (ATF). The injector gasket, belting, arm, wiper blades and injector clamp were also replaced. Refer to Invoice 3 below.

Serviced on: 14.06.2018 / 13:14:00 ← Time Out: 14.06.2018 / 17:14:55
Remarks: (Next PM-23/07/2018 time-15:00)
Job Card Nos: 602787019 Type: JP Odometer Reading: 410,626

PM/PROBLEM REPORTED

R15 HYUNDAI i-40 DOCKING 5
S.1 Engine Noisy
17.1 Wiper Blade/Washer
17.8 Others [u/c noisy]
H000 Mechanic Team Repair - Liew Yiew Sian
QC QC TEST BY LAT - Liew Yiew Sian

MATERIAL CHANGED

SN	DESCRIPTION	QTY
1	I40VC OIL FILTER	1.000 EAC
2	HYUNDAI INJECTOR GASKET(33818-27000)	4.000 EAC
3	I40VC V-RIBBED BELT	1.000 EAC
4	(I40)ATF, FULLY SYN SPIV	4.000 LTR
5	I40VC/IONIQ WIPER BLADE 26" (DRIVER)	1.000 EAC
6	I40VC/IONIQ WIPER BLADE 16" (PASSENGER)	1.000 EAC
7	I40V3 ARM COMPLETE-FR LWR RH	1.000 EAC
8	I40VC ARM ASSY-FR ASSIST	1.000 EAC
9	I40VC *BOLT ASSY-INJECTOR CLAMP	4.000 EAC
10	(ALL) SPARK PowerSyn, Fully Syn SW40	5.030 L

Invoice 3 shows the servicing done on the Insured Vehicle on 14 June 2018, a day before the incident occurred. An issue of similar nature pertaining to the engine and undercarriage were reported. The servicing package had included the changing of engine oil, oil filter and auto transmission fluid (ATF). The injector gasket, belting, arm, wiper blades and injector clamp were also replaced.

27. 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.
28. 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 Soh had mentioned to us there were no indications of abnormally high temperatures when he was driving the Insured Vehicle on the day of the incident. Moreover, an overheated engine would have caused the Insured Vehicle to stall. However in this case, Mr Soh was the one who noticed thick smoke emitting from the front bonnet while he was driving the Insured Vehicle and proceeded to stop along the road and switch off the engine of the Insured Vehicle.
29. 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 as the fire occurred as Mr Soh was driving the Insured Vehicle. The location where the Insured Vehicle caught fire was also observed to be not at a secluded location.

30. 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 nature is also supported by the condition of the wirings that were found in the engine compartment of the Insured Vehicle, which was earlier discussed in paragraph 8 above.
31. Our checks with both local and international bodies and associations had 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.

Conclusion

32. 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 original factory fitted wirings inside the engine compartment, somewhere around the rear left portion of the engine compartment.
33. 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.
34. There were no modification(s) or additional electronic and/or electrical component(s) fitted on the Insured Vehicle at the time of our inspection of the Insured Vehicle.
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
AMSQE, AMIRTE, AFF SAE, M.MATAI, AFF Inst AEA
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