LKK Auto Consultants Pte Ltd
Company Registration No. 199607198R
51 UBI AVE 1, #01-25 PAYA UBI INDUSTRIAL PARK, SINGAPORE 408933 TEL : (065) 62563561 FAX : (065) 67414108

Your Ref: 2473355709SG
Our Ref : CI/AIG19004979/D

19 March 2019

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

TECHNICAL INVESTIGATION REPORT OF FIRE INCIDENT INVOLVING THE INSURED VEHICLE SLJ 3671Z ON 30 JANUARY 2019

1. I refer to your request dated 25 February 2019.

2. My analysis, comments and opinions with respect to the cause of fire to the insured vehicle SLJ 3671Z (herein referred to as "**Insured Vehicle**") are set out below.

Inspection of the Insured Vehicle

3. The Insured Vehicle was physically inspected on 01 March 2019 at the premises of M/s ComfortDelgro Engineering Pte Ltd, 205 Braddell Road, Singapore 579701.

4. A static inspection was carried out to the Insured Vehicle where the following general information was recorded: -

Vehicle Registration No.	: SLJ 3671Z
Make / Model	: Jaguar XJ 3.0L Diesel
Chassis No	: SAJAC2229ANV09855
Year of Registration	: 2010 (September)
Mileage	: N.A (wiring affected)

5. The Insured Vehicle was observed to have sustained severe fire damage to its interior compartment and engine compartment. Its rear portion and front portion had also sustained minor fire damage that was mainly due to heat from the fire.

6. From the burn pattern, the fire appears to have been most intense at the centre portion of the Insured Vehicle. This follows the extent of burn damage being more severe within the interior compartment as compared to the burn damage within the engine compartment. See photo 1 – 5 below.

Photo 1 shows a general view of the rear portion of the Insured Vehicle at the time of my inspection. The Insured Vehicle was observed to have sustained severe fire damage at its centre portion. Its rear portion had sustained minor fire damage that was mainly due to heat from the fire.

Photo 2 shows a general view of the front portion of the Insured Vehicle at the time of my inspection. The Insured Vehicle was observed to have sustained severe fire damage at its centre portion. Its front portion had sustained minor fire damage that was mainly due to heat from the fire.

Photo 3 shows a general view of the left side of the Insured Vehicle at the time of my inspection. From the burn pattern, the fire appears to have been most intense at the centre portion (circled) of the Insured Vehicle. This follows the severe fire damage that was observed within the interior compartment of the Insured Vehicle.

Photo 4 shows a general view of the interior compartment of the Insured Vehicle, which was affected the most by the fire. Almost all the parts within the interior compartment were severely burnt and/or melted.

Photo 5 shows a general view of the engine compartment of the Insured Vehicle. Although the parts within the engine compartment were also affected by the fire, the extent of burn damage was less severe as compared to the parts within the interior compartment.

Circumstance of Incident

7. From the police report T/20190131/2016, which was made by one Abel Tay (herein referred to as "**Mr Tay**"), I note that the fire to the Insured Vehicle had started at a time when he was driving the Insured Vehicle. Mr Tay first detected smoke coming out from the centre console within the interior compartment of the Insured Vehicle. He then quickly drove the Insured Vehicle to the road shoulder, off the engine and alighted from the Insured Vehicle together with his wife who was seated on the front passenger seat at that time. After walking away from the Insured Vehicle, Mr Tay noticed spark coming out from the exhaust pipe area. He then called SCDF for assistance. Fire soon broke out within the interior compartment. SCDF officers arrived and put out the fire.

8. I spoke to Mr Tay on 19 February 2019 and through telephone conversation, I was able to gather further information pertaining to the incident as well as information pertaining to the history of the Insured Vehicle.

9. According to Mr Tay, he was driving the Insured Vehicle heading to his home at Loyang Rise from Changi Airport area. His wife was seated on the front passenger seat. During the journey, Mr Tay noticed the yellow DPF (Diesel Particulate Filter) light illuminate on the instrument panel. His usual practice upon seeing the DPF light illuminated is to drive the Insured Vehicle on an expressway where higher travelling speed range is attainable. Basing on his reading of the vehicle's booklet/manual, it was advised that such procedure is necessary when the DPF light illuminates. From his recollection, the DPF light will illuminate about 2 months once and goes off after driving the Insured Vehicle at higher travelling speed range.

10. For this particular incident, upon seeing the DPF light, Mr Tay decided to make a detour and drive the Insured Vehicle along Tampines Expressway. After the DPF light was no longer illuminated, Mr Tay continued his journey home. Whilst still along Tampines Expressway, he noticed, from the rear view mirror, that smoke was coming out from the rear of the Insured Vehicle. Just prior to this, his wife had also mentioned to him that she felt the area under the front left passenger seat was quite hot. Eventually, smoke was also detected coming out from the centre console/armrest area of the Insured Vehicle.

11. Mr Tay immediately steered the Insured Vehicle to the left shoulder of Tampines Expressway. Upon stopping the Insured Vehicle, he switched off the engine and told his wife to alight from the Insured Vehicle. Both he and his wife then walked towards the back and away from the Insured Vehicle. About 10m away, Mr Tay looked at the Insured Vehicle and from the rear, he saw flames at the underside of the Insured Vehicle. He called SCDF for assistance. Fire soon engulfed the interior compartment of the Insured Vehicle before it was eventually extinguished by SCDF officers upon their arrival.

12. With regard to the history of the Insured Vehicle, Mr Tay informed me that it was purchased second hand about 2 years ago. The Insured Vehicle is registered under his name and he is the main user of the Insured Vehicle. As far as he can recall, there has not been any major mechanical or electrical issue(s) with the Insured Vehicle. The last servicing carried out was in 28 January 2019, which was 2 days before the fire incident. Mr Tay had provided me a document relating to this servicing.

13. I was also informed by Mr Tay that a few days before the fire, he received a letter from Wearnes Automotive Pte Ltd. The letter was to inform him that there was a safety related problem to the Insured Vehicle where the airbag may possible not deploy correctly in the event of an impact. The letter had also advised Mr Tay to make an appointment for the Insured Vehicle to be sent to Wearnes Automotive Pte Ltd for rectification work. As at the time of fire, Mr Tay has not made any appointment.

14. Mr Tay informed me that he had taken some photographs during his time at the incident location and these were duly forwarded to me for review.

Investigation and Technical Analysis

15. The photographs provided to me by Mr Tay had showed the Insured Vehicle after the fire was extinguished. From the photographs, the Insured Vehicle could be seen stopped along the side of the roadway with the damage of burn nature similar to that as observed during my inspection of the Insured Vehicle. No other notable information could be gathered from the photographs that were taken by Mr Tay at the incident scene. See photo 6 & 7 below.

Photo 6 shows the Insured Vehicle at the incident scene after the fire was extinguished (photograph taken by Mr Tay at the incident scene).

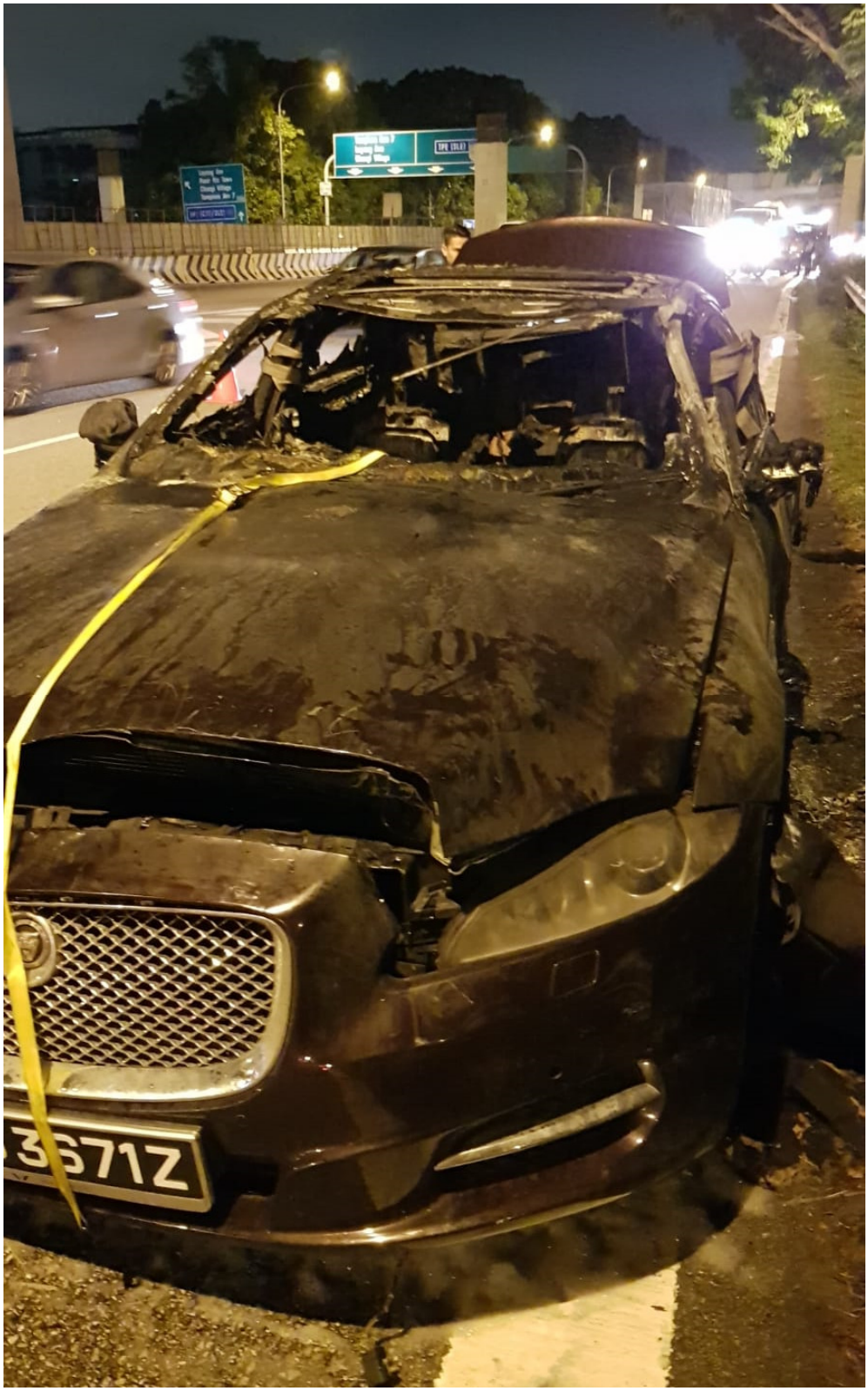


Photo 7 shows the Insured Vehicle at the incident scene after the fire was extinguished (photograph taken by Mr Tay at the incident scene).

16. My review of the document provided by Mr Tay relating to the servicing of the Insured Vehicle revealed that the Insured Vehicle was last serviced on 28 January 2018, which was 2 days before this fire incident. The mileage of the Insured Vehicle was recorded as 113,922km. It was also noted that a standard service was carried out to the Insured Vehicle where the engine oil and engine oil filter were replaced. See photo 8 below showing the document that was provided by Mr Tay.

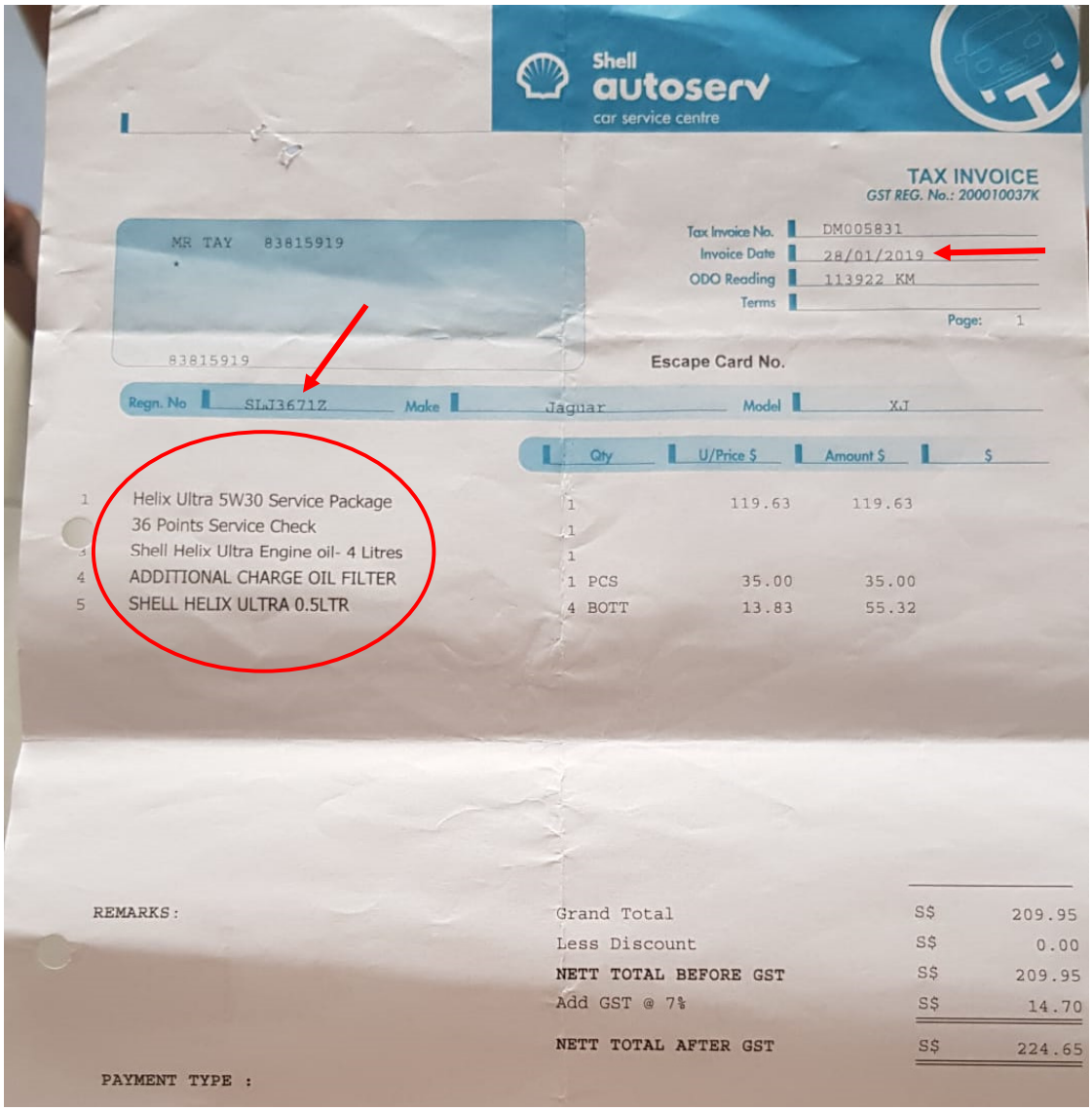


Photo 8 shows the document relating to the servicing of the Insured Vehicle that was carried out 2 days prior to the fire incident. A standard service was carried out to the Insured Vehicle where the engine oil and engine oil filter were replaced.

17. For this case, the severity of the burn damage sustained to the centre portion of the Insured Vehicle as compared to its other areas indicates that the origin of fire was at the centre body of the Insured Vehicle, within its interior compartment.

18. According to Mr Tay, after alighting from the Insured Vehicle, he saw flames at the underside of the Insured Vehicle; and before the fire, the yellow DPF light had illuminated on the instrument panel. My research and ground investigation revealed that this model vehicle is fitted with a Diesel Particulate Filter (DPF). As with all modern-day diesel engine motor vehicles like the Insured Vehicle, DPF, a cannister like component (part), is fitted along the exhaust system of such type of motor vehicles. Briefly, DPF is a component (part) that captures diesel particulates through a combination of filtration mechanisms, preventing the diesel particulates from being release into the atmosphere as harmful gases. An illustration of a simple filtration mechanism inside a PDF is shown below.

19. Like all filter element, the filter element inside the DPF will begin to clog as soot (carbon) and other diesel particulate starts to accumulate on the filter element inside the DPF over a period of time. Cleaning of DPF is therefore necessary as part of its periodic maintenance. This is usually done through a process call “regeneration”, when the exhaust temperature becomes high enough (usually at 600^{o}c) to burn off the soot and other diesel particulate that have accumulated in the DPF. Driving a vehicle over long distance at speeds higher than road speeds allowed for urban city driving is the most common method of regenerating (cleaning) the DPF.

20. Smoke and/or fire from the underside of the vehicle or flames emanating form within the exhaust tailpipe can occur for such diesel engine vehicles when the exhaust temperature within the DPF increases due to clogging (exhaust gases becomes restricted and unable to flow out smoothly) or even when "regeneration" (cleaning). Heat from a fire within the DPF may possibly radiate to the surrounding vehicle components leading to heating of the vehicle underside, melting of interior components and in worst case, a potential interior fire.

21. The DPF of the Insured Vehicle is located at the underside centre of the Insured Vehicle, below the centre console of the Insured Vehicle. Mr Tay's wife had felt the area under the front left passenger seat was quite hot and Mr Tay himself had noticed smoke coming out from the rear of the Insured Vehicle and from the centre console/armrest area of the Insured Vehicle just before the fire. The evidence gathered would then appear to indicate that the fire to the Insured Vehicle was a result of heat radiating from a fire that had occurred within the DPF that was fitted at the underside centre of the Insured Vehicle. Mr Tay was in fact regenerating (cleaning) the DPF when the fire occurred thereafter. See photo 9 & 10 below showing the DPF of the Insured Vehicle.

Photo 9 shows the left centre of the Insured Vehicle, at its left front door area. The DPF is located at the underside centre of the Insured Vehicle (arrowed).

Photo 10 shows the DPF (arrowed) of the Insured Vehicle. The DPF is located at the underside centre of the Insured Vehicle. From my observations, the DPF of the Insured Vehicle was blackened, indicating exposure to the fire/extreme heat.

22. I was also able to gather during the course of my investigations that there were several precautionary notices in overseas pertaining to possible fire arising from DPF fitted on similar type of vehicles as the Insured Vehicle. However, my checks with Land Transport Authority (LTA) reveal that there was no manufacturer recall campaign arising from any DPF issue. See screen shot below showing the precautionary notice from overseas.

2005-2007 Jaguar S Type and XJ diesel vehicles – Diesel Particulate Filter

Make & Model : 2005-2007 Jaguar S Type and XJ Diesel

Number of Vehicles Affected: 68

Model Years From: 2005 to 2008 (MY2006 to MY2008 fitted with a diesel engine and a diesel particulate filter)

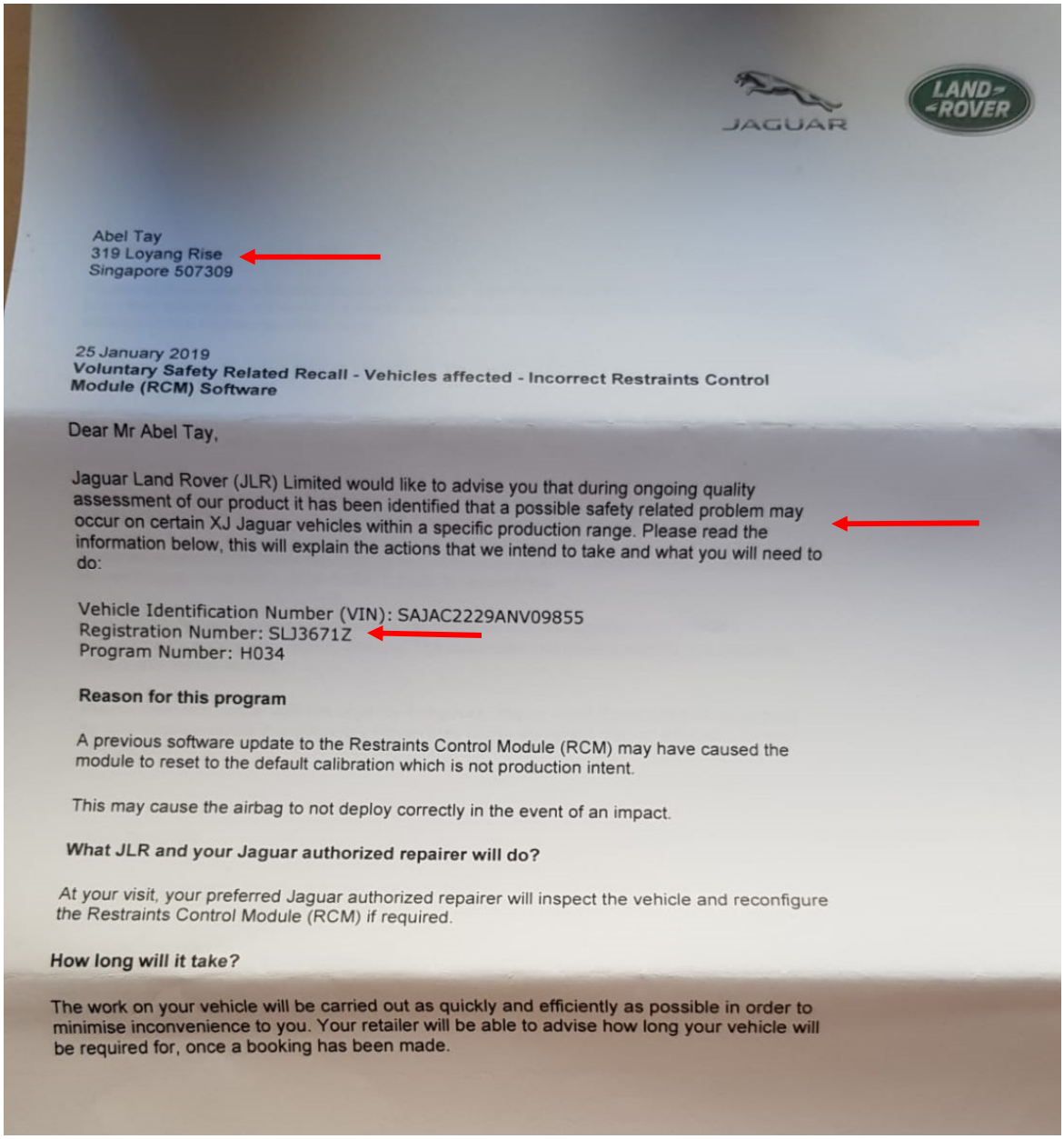
Whats wrong?: When these vehicles are driven under a unique driving pattern where the vehicle is predominantly used for short journey distances, under slow driving style and light throttle application, excessive soot and hydrocarbons may become trapped in the Diesel Particulate Filter (DFP).

The DPF on 2.7 Litre V6 diesel engine vehicles may exhibit smoke and/or fire from the underside of the vehicle, flames emanating from within the rear exhaust tailpipe or an orange glow from the underside of the vehicle. Heat from a fire within the DPF can radiate to the surrounding vehicle components and may lead to heating of the underside of the transmission tunnel and subsequent melting of the interior components and potential interior fire.

VIN Range: S Type. N50727 to N82818. XJ. H00155 to H17094.

What to do?: Contact your Jaguar dealer.

23. From my investigations, a manufacturer recall campaign involving the Insured Vehicle was initiated in 2017. The recall was for software issue to the control module of the restraint system (airbags, seatbelts etc). From the records, the Insured Vehicle has yet to be sent for rectification to address the purpose of the recall. Mr Tay also confirmed that he received a letter from Wearnes Automotive Pte Ltd informing him of this issue. See photo 11 showing the letter addressed to Mr Tay.


JAGUAR

LAND ROVER

Abel Tay
319 Loyang Rise
Singapore 507309

25 January 2019
Voluntary Safety Related Recall - Vehicles affected - Incorrect Restraints Control Module (RCM) Software

Dear Mr Abel Tay,

Jaguar Land Rover (JLR) Limited would like to advise you that during ongoing quality assessment of our product it has been identified that a possible safety related problem may occur on certain XJ Jaguar vehicles within a specific production range. Please read the information below, this will explain the actions that we intend to take and what you will need to do:

Vehicle Identification Number (VIN): SAJAC2229ANV09855
Registration Number: SLJ3671Z
Program Number: H034

Reason for this program

A previous software update to the Restraints Control Module (RCM) may have caused the module to reset to the default calibration which is not production intent.

This may cause the airbag to not deploy correctly in the event of an impact.

What JLR and your Jaguar authorized repairer will do?

At your visit, your preferred Jaguar authorized repairer will inspect the vehicle and reconfigure the Restraints Control Module (RCM) if required.

How long will it take?

The work on your vehicle will be carried out as quickly and efficiently as possible in order to minimise inconvenience to you. Your retailer will be able to advise how long your vehicle will be required for, once a booking has been made.

Photo 11 shows the letter that Mr Tay received pertaining to the software issue to the control module of the restraint system (airbags, seatbelts etc). The Insured Vehicle has yet to be sent for rectification to address the purpose of the recall.

Conclusion

24. Having investigated and technically analysed the damages of burnt nature to the Insured Vehicle, I am of the view that the cause of fire to the Insured Vehicle was due to fire that had occurred within the Diesel Particulate Filter (DPF) of the Insured Vehicle. For this particular case, heat from a fire that had occurred within the DPF had radiated to the surrounding components leading to fire within the interior compartment of the Insured Vehicle.

25. The diesel particles (soot, carbon etc) trapped by the filter element inside the DPF of the Insured Vehicle had self-ignited when the exhaust temperature within the DPF had increased as a result of clogging in the DPF.

26. My investigations also revealed that the Insured Vehicle was involved in a manufacturer recall campaign in year 2017. The purpose of the recall was for software issue to the control module of the restraint system (airbags, seatbelts etc). Such type of issue does not pose any fire risk and hence is not related to this fire incident. There was no manufacturer recall campaign for DPF related issue(s) to the Insured Vehicle. There were however several precautionary notices in overseas pertaining to possible fire arising from DPF.

27. In view of this fire incident, a similar other incident that I had also investigated, and the precautionary notices pertaining to possible vehicular fire arising from heat radiating from DPFs, it is suggested that insurers, when underwriting, should consider the possible risk of vehicular fire that such type of modern day diesel engine motor vehicles poses.

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