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Our Ref : CI/TPD19012749/P

4<sup>th</sup> November 2019

**Fatal Accident Investigation Team**

Traffic Police Department  
Singapore Police Force  
10 Ubi Avenue 3  
Singapore 408865

**MECHANICAL INSPECTION REPORT OF GARBAGE TRUCK XB 6910D**

1. I refer to your request on 8<sup>th</sup> July 2019 to conduct a physical inspection of a Garbage truck bearing registration number XB 6910D (herein referred to as “**Garbage truck**”), which was involved in a fatal road traffic accident on 10<sup>th</sup> June 2019.
2. The objective of this inspection is to determine if there was any possible mechanical failure to the Garbage truck that may have contributed to the accident.
3. Following the request, I had carried out a physical inspection of the Garbage truck on 30<sup>th</sup> October 2019 at the premises of Traffic Police vehicle pound, 517 Airport Road Singapore 539942. I now set out below my observations and comments with respect to this inspection.

**General Condition**

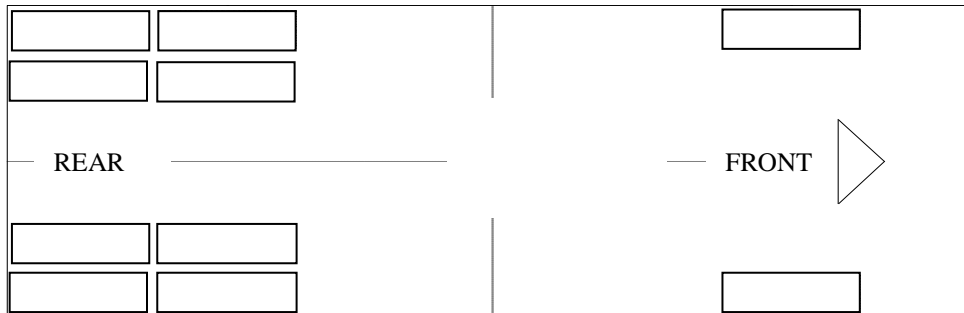
4. The mileage of the Garbage truck at the time of my inspection was 262,358km.
5. There was no visible damage observed on the Garbage truck at the time of my inspection.
- 6.

**Tyres and Wheel Rims**

7. The tread depth for the front right tyre was observed to be insufficient level. However the front left tyre and 8 rear tyres of the Garbage truck were observed to be in serviceable condition and sufficiently inflated for vehicular operation. I did not find any tear, cut or burst mark(s) on the outer and the inner sidewalls as well as across the tread of the 10 tyres. The tyre brand, tyre size and remaining tread depth of the 10 tyres of the Garbage truck were recorded as follows:-

Firenza 295/80 R22.5 (9.8mm)

Firenza 295/80 R22.5 (10.3mm)



Firenza 295/80 R22.5 (11mm)

Firemax 295/80 R22.5 (0mm)

8. The 10 tyres were observed to be wrapped around standard steel wheel rims that were found to be without any damage. See photo 1 – 9 below.



**Photo 1** shows a general view of the instrument cluster of the Garbage truck at the time of my inspection. The mileage of the Garbage truck was 262,358km



**Photo 2** shows a general view of the front body of the Garbage truck at the time of my inspection. The Garbage truck was observed to be intact and unaffected by the accident.



**Photo 3** shows a general view of the right body of the Garbage truck at the time of my inspection. The Garbage truck was observed to be in good general condition.



**Photo 4** shows a general view of the left body of the Garbage truck at the time of my inspection. The Garbage truck was observed to be intact and unaffected by the accident.



**Photo 5** shows a general view of the rear body of the Garbage truck at the time of my inspection. The Garbage truck was observed to be intact and unaffected by the accident.





**Photo 6** shows the condition of the front right tyre of the Garbage truck, which was observed to be in unserviceable condition with remaining tread depth of approximately 0 mm. The tyre, which was wrapped around standard steel wheel rim, was also observed to be sufficiently inflated for vehicular operation. There was no tear, cut or burst mark(s) on the outer and the inner sidewalls as well as across the tread of the 10 tyres that were fitted on the Garbage truck.



**Photo 7** shows the condition of the rear right tyre of the Garbage truck, which was observed to be in serviceable condition with remaining tread depth of approximately 11mm. The tyre, which was wrapped around standard steel wheel rim, was also observed to be sufficiently inflated for vehicular operation.



**Photo 8** shows the condition of the rear left tyres of the Garbage truck, which was observed to be in serviceable condition with remaining tread depth of approximately 9.8mm. The tyres, which were wrapped around standard steel wheel rim, were also observed to be sufficiently inflated for vehicular operation. There was also no damage found on all 10 steel wheel rims of the Garbage truck.



**Photo 9** shows the condition of the front left tyres of the Garbage truck, which were observed to be in serviceable condition with remaining tread depth of approximately 10.3mm. There was also no tear, cut or burst mark(s) on the outer and the inner sidewalls as well as across the tread of the 10 tyres that were fitted on the Garbage truck.

## Engine Compartment & Operating Fluids

9. Upon examination of Garbage truck's engine compartment, I had observed all the parts and components inside the engine compartment to be intact and unaffected by the accident. The engine oil fluid was found to be of sufficient level for operating purpose. However the engine coolant was observed to be low level and leaking from the radiator and the Power steering fluid was also observed to be of low level. Visually, there was also no contamination found to these fluids.
10. Further examination of the engine compartment revealed, there was no sign(s) or indication(s) of fresh fluid leakage and/or fluid stain within the engine compartment of the Garbage truck.
11. My subsequent checks on the underside of the Garbage truck also revealed no fluid stain. Visually, the various undercarriage components of the Prime Mover were all observed to be intact and without any visible damage. However fresh coolant fluid was observed leaking from the radiator. See photo 10 – 15 below.



**Photo 10** shows a general view of the Garbage truck's engine compartment, which was accessed by lifting the front cabin of the Garbage truck. The various parts and components inside the engine compartment were unaffected by the accident. There was also no sign(s) or indication(s) of fresh fluid leakage and/or fluid stain within the engine compartment





**Photo 11** shows the air in the air brake cylinders of the Garbage truck at the time of my inspection. The air in the cylinder was observed to be of sufficient level & serviceable at the time of the accident.



**Photo 12** shows the engine oil dip stick of the Garbage truck at the time of my inspection. The engine oil was observed to be of sufficient level and without any visible contamination.





**Photo 13** shows the power steering fluid dip stick of the Garbage truck at the time of my inspection. The power steering fluid was observed to be of low level and without any visible contamination.



**Photo 14** shows the engine coolant reservoir of the Garbage truck at the time of my inspection. The engine coolant was observed to be of low level (arrowed)



**Photo 15** shows the undercarriage of the Garbage truck at the area where the engine housing located. Observed were fresh coolant fluid leakage and/or fluid stain(s) on the underside of the Garbage truck (circled)

### Steering System & Braking System

12. Static brake tests conducted on the Garbage truck revealed no abnormality. The air brake booster had responded well to the various tests conducted. There was also no abnormal movement of the brake pedal when it was depressed. In general, the static brake tests had suggested that there was no internal leakage of pressure/vacuum in the braking system of the Garbage truck. The braking system of the Garbage truck was likely to be in serviceable condition at the material time. This was also taking into consideration that the air brake was of sufficient level, and also that there was no sign(s) of air leakage along the brake hoses, brake pipes and air cylinders.
13. Static test on the steering system of the Garbage truck also revealed no abnormality to the steering system. I did not experience any abnormal free play and/or other resistance when turning the steering wheel left and right to full lock positions. My visual examination of the various steering components which had included the rack and pinion, tie rods, tie rod ends and ball joints had revealed that these components were all generally in good condition. See photo 16 - 24 below.



**Photo 16** shows the brake pipe (arrowed) at the rear right wheel of the Garbage truck. I did not observe any leakage of brake fluid at the time of my inspection of the Garbage truck. My static tests of the Garbage truck's braking system, along with my visual examination of the various mechanical components in the braking system, had indicated that there was no internal leakage of pressure/vacuum. Hence the braking system of the Garbage truck was likely to be in serviceable condition at the material time of accident.



**Photo 17** shows the brake pipe (arrowed) at the rear left wheel of the Garbage truck. I did not observe any leakage of brake fluid at the time of my inspection of the Garbage truck. My static tests of the Garbage truck's braking system, along with my visual examination of the various mechanical components in the braking system, had indicated that there was no internal leakage of pressure/vacuum. Hence the braking system of the Garbage truck was likely to be in serviceable condition at the material time of accident.





**Photo 18** shows the brake pipe (arrowed) at the front right wheel of the Garbage truck. I did not observe any leakage of brake fluid at the time of my inspection of the Garbage truck. My static tests of the Garbage truck's braking system, along with my visual examination of the various mechanical components in the braking system, had indicated that there was no internal leakage of pressure/vacuum. Hence the braking system of the Garbage truck was likely to be in serviceable condition at the material time of accident.



**Photo 19** shows the brake pipe (arrowed) at the front left wheel of the Garbage truck. I did not observe any leakage of brake fluid at the time of my inspection of the Garbage truck. My static tests of the Garbage truck's braking system, along with my visual examination of the various mechanical components in the braking system had indicated that there was no internal leakage of pressure/vacuum. Hence the braking system of the Garbage truck was likely to be in serviceable condition at the material time of accident.



**Photo 20** shows the air brake cylinder (arrowed) at the undercarriage of the Garbage truck. I did not observe any leakage of air brake fluid at the time of my inspection of the Garbage truck. My static tests of the Garbage truck's braking system, along with my visual examination of the various mechanical components in the braking system had indicated that there was no internal leakage of pressure/vacuum. Hence the braking system of the Garbage truck was likely to be in serviceable condition at the material time of accident.



**Photo 21** shows the various undercarriage components at the front right wheel of the Garbage truck, in particular the steering tie rod end (arrowed). The various steering components were all found to be intact, suggesting that the steering system of the Garbage truck was likely to be in serviceable condition at the material time of accident. There was also no sign of fluid stain(s) observed on the various undercarriage components.



**Photo 22** shows the various undercarriage components at the front left wheel of the Garbage truck, in particular the steering tie rod end (arrowed). The various undercarriage components of the Garbage truck were all found to be intact without any visible damage. There was also no sign of fluid stain(s) observed on the various undercarriage components.



**Photo 23** shows the steering box component (arrowed) at the undercarriage of the Garbage truck was found to be intact without any visible damage. There was also no sign of fluid stain(s) observed on the various undercarriage components.





**Photo 24** shows the front left wheel of the Garbage truck turned to its full right. During my steering system test, I did not experience any abnormal free play and/or resistance when I had turned the steering wheel towards full left and full right. This would suggest that the steering system of the Garbage truck was likely to be in serviceable condition at the material time of accident.

### Electronic Safety / Warning Indicators

14. The Garbage truck automatic self-test of the functionality of its various electronic operating systems like the Anti-Lock Brake System (ABS) and Traction Control System (TC) during cranking of the engine had indicated that these systems were in working condition and without abnormality. This can be established from the warning lights disappearing from the instrument panel after the self-test. See photo 25 & 26.



**Photo 25** shows the warning light for Anti-Lock Brake System (ABS) and Traction Control System (TC) (arrowed) appearing on the instrument panel of the Garbage truck during the self-test of its various electronic operating systems when its engine was cranked.



**Photo 26** shows no warning lights illuminated on the instrument panel of the Garbage truck after the engine was cranked. This would suggest that there was no abnormality to the various electronic operating systems of the Garbage truck, like the ABS & TC etc.

### **Operational Behaviour of the Garbage truck**

15. A short operational test to the Garbage truck, to primarily determine whether there was any abnormality to its various operating systems like its engine system, its transmission system, steering system and braking system was subsequently carried out. The test was conducted by driving the Garbage truck forward, stopping, before reversing and coming to a stop again.
16. During the operational test, the various transmission gears of the Garbage truck were able to be engaged without any difficulty by stepping on the clutch pedal and manually shifting the gear lever. There were no abnormal sounds heard and/or abnormal behaviour of the Garbage truck's engine system. It was able to move forward and backward normally. The braking system was also found to be in working condition as the Garbage truck was able to slow down and come to a complete stop upon depressing of the brake pedal. See photo 2 & 24.

### **Conclusion**

17. From my physical inspection of the Garbage truck, it appears that its engine system, steering system, braking system and transmission system were all in serviceable condition. I did not find any evidence(s) to suggest that there was possible mechanical failure to the Garbage truck that may have caused and/or contributed to the accident. This is also taking into consideration that the operational test of the Garbage truck, which I had conducted, did not produce any sign(s) or symptom(s) to suggest that there was any abnormality to its various operating systems.



18. The front left tyres and 8 rear tyres fitted on the Garbage truck were also found to be in serviceable condition. I did not find any tear, cut or burst mark(s) on the outer and the inner sidewalls as well as across the tread of the 9 tyres. 9 tyres were also observed to be sufficiently inflated for vehicular operation with remaining tread depth of approximately 9.8 mm – 11 mm. However the tread depth of the front right tyre was observed to be in unserviceable condition with a remaining tread depth of 0 mm.

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