



Operational Efficiency & Readiness

OPERATIONAL REVIEW

F3200236
Vehicle Fire
Stanley Road, Dromore
Ashburton
15-03-2021

*Mā te mōhio ka anga whakamua
Through knowledge we improve*

Operational Efficiency and Readiness (OER)

Our purpose is to provide operational assurance advice to the Chief Executive and Deputy Chief Executive Service Delivery. The advice will enable them to achieve their responsibilities for the operational efficiency and operational readiness of Fire and Emergency New Zealand (Fire and Emergency).

OER is independent, objective, and provides quality operational assurance advice to support continuous operational improvement within Fire and Emergency. OER is required to report quarterly to the Fire and Emergency Audit and Risk Committee and is a function of the Office of the Chief Executive.

Purpose of Review

An Operational Review examines how Fire and Emergency responded to substantial, significant or unusual incidents to provide continuous improvement. While it considers the application of policies, procedures and operational instructions (as they applied to the event), its primary focus is to assist Officers and firefighters learning by sharing knowledge and experiences gained through actual incidents.

A review will focus on the facts and does not provide conjecture or alternative opinions. It identifies critical findings to inform Senior Managers to develop corrective actions. It also identifies general findings related to equipment, tactics, or activities that worked well to support organisational learning.

Once completed, all reports are published on the Operational Efficiency webpage for all to read and share.

Methodology

The review team use the Incident Cause Analysis Method (ICAM) as a guide to conduct operational reviews. In addition, some of the team members have attained the "Implementing a monitoring, evaluation and reporting program" qualification (AHCBUS607) through Technical and Further Education (TAFE), New South Wales, Australia. This process may have been utilised as a means of capturing information and data for this review.

The content contained within this report is an honest and accurate reflection of the information provided to the team through debriefs, interviews, and data collected through Fire and Emergency reporting systems.

Note, a Fire and Emergency New Zealand login is required to access most links within this document.

Review Requested by

A.N.C. Paul Henderson, Region Manager, Te Ihu

Review Team

Review Lead:	████████████████████
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Executive Summary

In the late afternoon of March 15th, 2021, the Ashburton Brigade responded to a Combine Harvester on fire on a farm approximately 14 kms out of town. They were also told that the paddock containing the harvester had stubble on fire. The stubble is the plant product that remains after a grain crop is harvested. On this property, the stubble is unusually ploughed back into the soil, which produces a very fine tinder-dry fuel, driven back onto the ground until ploughed.

The farmer managed to move the burning harvester into the adjacent paddock prior to brigade arrival; this was the location the crew extinguished the machine. While this was occurring, the Officer considered his options to extinguish the slow-burning stubble fire.

Unbeknown to him, the high fuel loading and change in wind direction resulted in the Ashburton appliance being in the direct path of the head of the fire. The driver desperately tried to move it, but the brakes wouldn't release, and it quickly becomes fully involved. The appliance and everything on it was lost entirely.

The review team identified a number of factors contributing to this incident, with eight recommendations to reduce the likelihood of it happening again.

The Event

On March 15th 2021, at 16:21, the Southern Communications Centre (Comcen) received a 111-call reporting a combine harvester was on fire in a paddock at [REDACTED] Stanley Road, Dromore Ashburton. Further information stated that the stubble was also on fire. There was initial confusion from the Comcen because ASHB622 had just left a truck fire at the same property. The Comcen operator advised the caller that Ashburton had attended, and the fire was extinguished.

During this time, another Comcen operator questioned the Ashburton 622 (ASHB622) crew about their attendance. Comcen then received a further 111-call from the property and quickly identified two separate unrelated incidents at the same address. A new event was created at 16:23, and ASHB622 and Ashburtons Tanker (ASH6211) responded.

The ASHB622 OIC and crew looked down the accessway from the road and noticed smoke coming from a paddock some distance away.

(The farmer had attempted to extinguish the machinery fire and suppress the stubble fire with a Co2 extinguisher located on the combine harvester. Then, extinguishers from around the farm were brought to the incident by another farmworker. The farmer then moved the harvester into an adjacent cultivated paddock for safety, prior to Fire and Emergency arrival.)

At 16:28, a priority message was transmitted while travelling down the accessway. The OIC observed the harvester being in a separate paddock to the apparent stubble fire. A K88 arrival was transmitted at 16:29, followed by a further Priority message at 16:29 requesting another appliance to deal with the stubble fire.

The ASHB622 OIC's priority was to focus on the extinguishment of the combine harvester, as the stubble fire did not pose an immediate threat to any property. The OIC directed the appliance into the connecting cultivated paddock adjacent to the stubble fire and drove up to the combine harvester located approximately 94 metres from the entry gate and accessway. *Fig 1.2*

At 16:31, Ashburton 621 (ASHB621) responded to the incident.

Another priority message was transmitted at 16:32 for another tanker to assist ASHB622 at the combine harvester to ensure they had sufficient water.

At 16:32, Pendarves tanker (PEND8911) responded to assist ASHB622.

The tactical task was to use the hose reel to extinguish the fire and conserve water as it was still smoking.

While the crew attended the harvester, the OIC of ASHB622 began a size up of the stubble fire in the corresponding paddock. The OIC noticed the paddock being significantly bigger than a regular grazing paddock (23.7ha). The fire behaviour at that point was relatively slow with what appeared to be a low flame height. Furthermore, the wind was steady but not strong, heading down the paddock from his left to right (North to South).

At 16:37 ASHB6211 arrived and immediately transmitted a priority for another urban and rural appliance to assist with the stubble fire, Ashburton 627 (ASHB627) and Hinds 9371 (HIND9371) were responded. The

OIC ASHB6211 decided to attack the left flank of the stubble fire to cut it off from a macrocarpa hedge along the east boundary.

During the ASHB622 OIC's initial size-up, he believed the head of the fire had passed his position and the crew dealing with the harvester. His next tactic was to attack what appeared to be the right flank. The OIC also noticed the stubble on the ground and noted that in his experience of stubble fires, this paddock looked somehow different. However, he felt it was safe enough to enter based on his view of available fuel, as the stubble had been cut so low. *Fig 1.0*

With the harvester now extinguished, the OIC ASHB622 directed the crew into the paddock to attack the flank. He asked the crew to relocate the appliance into the paddock on the flank and instructed the driver to face the appliance in the direction the fire was travelling and near to the gate they had entered. *Fig 1.1*

He then tasked the crew to attack the flank of the fire to reduce the risk of spread. Knowing their water was limited but not critical, they immediately got to work with one hose reel for the initial attack while waiting for the tanker to arrive.

At 16:43, the OIC of ASHB621 decided to protect the macrocarpa hedge on the southern boundary situated in the path of the head of the fire. The OIC ensured his appliance was on hard standing and positioned for escape down the access way.

The ASHB622 crew got to work but the smoke overcame them and visibility was deteriorating rapidly. They also noticed that the wind had significantly increased.

The farmworker present in the adjacent paddock ^{Fig 1.2} with the combine harvester stated he witnessed the fire advancing up the paddock behind the appliance. The fire investigator's findings indicate the appliance was situated inside a large curved fire front, created by the farmers' initial extinguishment attempts, the oscillating moderate wind and coalesce burning.

Both persons on the branch noticed what appeared to be a wall of flame picked up by the wind advancing towards them and the appliance. They alerted the pump operator, who immediately disengaged the pump and ran around to the driver's seat. The driver attempted to move the appliance, but it wouldn't move. The driver then returned to the pump panel to confirm it had disengaged, and while doing this, he noticed the fire had already gone under the rear left corner of the appliance.

The driver jumped through the flames to get to the driver's seat and tried again to move. The appliance wouldn't move, and the crew noticed the tyres on the rear quickly ignite and become well involved in fire. They yelled at the driver to get out. The crew safely retreated to the adjacent paddock where the combine harvester was located.

The OIC ASHB622 radioed the second appliance, ASHB6211, to inform them, "*I have lost the truck*".

Due to the smoke being dense, the OIC of ASHB6211 thought he meant the OIC of ASHB622 appliance was lost in the thick smoke, so no action was taken to extinguish it. The ASHB622 crew passed no further radio transmissions.

No other firefighters on the incident ground knew that there was an appliance on fire until the stubble fire was well controlled. Thick black smoke was noticed by other crews during the incident but was thought to be the harvester. Therefore, no attempt was made to extinguish ASHB622 by anyone.

Due to the size of the paddock (306m wide x 776m long) and smoke, appliances could not see each other.

The various sectors did not know the overall picture. A clear command and control structure was not established until later in the incident.

A K47 stop message for the incident was transmitted at 17.50.

Findings

- The quantity of unburnt material in the stubble paddock was not known or recognised as being significant. Figures supplied by the farmer from the harvester's computer indicated approximately 10-12 tons of cured fuel per hectare. The maximum loading amount in fire behaviour outlined in the *Manual for Predicting Fire Behaviour in New Zealand in New Zealand Fuels* is "not measured" as t/ha at 0.105m height ^{Fig 1.0}. The review team noted that the maximum reference on D6 was for 7.4 t/ha. The following pictures show the fire behaviour manual calculations, the paddock the appliance drove into, and a paddock harvested unbaled in windrows taken from the same farm.

Available Fuel Load (AFL) for Crop Stubble

The table below for crop stubble has been derived using data for several different crop species (i.e., wheat, barley and ryecorn).

The model for **unbaled crop stubble** should be used for both wheat and barley stubbles where harvesting residues have not been removed (e.g. in bales).

The **baled stubble** model should be used for stubbles that have been cut lower and the straw removed by baling. Due to a lack of data for unbaled barley, the model for unbaled stubble should only be used with caution in unbaled barley.

Crop Stubble Available Fuel Load (t/ha)		
Stubble Height (m)	Baled Stubble	Unbaled Stubble
0.05	0.9	
0.10	1.6	
0.15	2.3	
0.20	2.9	5.9
0.25	3.5	6.2
0.30	4.0	6.5
0.35	4.6	6.7
0.40	5.2	6.9
0.45	5.7	7.1
0.50	6.2	7.2
0.55	6.7	7.4



The paddock the Ashburton appliance drove into



Example of a paddock harvested unbaled in windrows on the same farm

- Lack of wildfire progression and refresher training, an unfamiliar fire environment and fuel loading contributed to gaining an appropriate level of situational awareness before committing to operational tactics. M1 TM Command and Control Technical Manual Section 3: Risk Assessment, Strategy and

Tactics 3.2.6, states; "*Failure to grasp the whole situation may lead to strategic or tactical errors (or indeed to pursuing an inappropriate aim)*". 3.2.7 *Whenever possible, officers should always conduct a 360° assessment (i.e. do a complete circuit around the incident, or at least as much as possible). Alternatively, obtain information from others who are better positioned.*" The team found no reference to assessing hazards at vegetation fires. The document hasn't been updated since January 2013, however, it does reference the updated Fire and Emergency Act, and interim Command and control policy.

- The Review team analysed the progression training for Fire and Emergency "urban" and "rural" volunteers from recruit through to Senior Officer, assisted by National and Regional Training.

The Review Team identified significantly different training hours for the same NZQA unit standards awarded. Such as:

Urban brigades have attended 16,020 vegetation incidents since the commencement of Fire and Emergency, with a total of possibly 29 hours of training. Meanwhile, Rural attended 4,428 vegetation incidents, with the total training possibly being 63 hours for the equivalent unit standards. For example:

- Urban recruits receive 3285 Demonstrate knowledge of the protection of personal safety at vegetation fires, 3286 Control vegetation fires using dry fire fighting techniques, and 3287 Suppress vegetation fires with water and with water additives unit delivered over seven hours of the recruits' course with some pre-course work. Rural recruits have the same standards delivered over 16 hours.
- Exercise Initial command and control at vegetation fire operations delivered over 13 hours for Rural crew leaders, yet Urban Senior Firefighters receive nil wildfire training at Station Officer level courses.
- Fire and Emergency 'Dangerous situation' card was not utilised. This fire potentially presented at least six dangerous situations. The Review Team found the 'The Pink Card' was not widely known or used by Urban Officers.
- The Rural Fire Management Handbook (Green Book) is also not widely known by or used by Urban Officers. The safety at vegetation fires acronym "LACES", is inside the front cover, and the 21 dangerous situations are listed inside the back cover.
- The Vegetation Section (24) of the Officer Handbook (Red Book), widely used by Urban Officers, identified several situations that would have highlighted hazards and control measures at this incident. The Officer didn't refer to this handbook during the size-up.
- There was very little knowledge of Vegetation Flame length vs Flame height and the relative kW/m ratio as stated in the Rural Fire Management Handbook. This knowledge assists in the deployment of successful tactical decisions
- A number of those present stated that the tyres on the appliance ignited far quicker and easier than expected. They believe the car valet silicon spray (XCEII) used on the tyres aided the rapid acceleration of flame on this appliance. The product has a Hazard class of 3 Flammable Hazchem

3YE UN 3295. The warning label on the products states *DANGER gives off FLAMMABLE VAPOR. Keep well away from heat, sparks and open flame.*

- There wasn't a complete understanding of the new Type 1 IVECO Pump features. The review team confirmed that it automatically disengages the pump while the pump is engaged when shifted into gear.
- The review team found that vehicle brakes have failed at previous incidents when involved in fire, affecting the crew's ability to move the appliance from harm's way. In addition, the team found that the nylon brake lines used on the IVECO appliance ^{Fig1.3} can be easily affected by fire, especially when put under pressure releasing the brakes.

Previous accident investigation completed on an event March 10th 2016 with a key finding:

Finding: 4

The appliance was located in an unburnt area of the paddock.

The driver could not then put the appliance back into drive; possibly due to the brake pedal issue, he heard the airline to the appliance brake burst due to the flames sweeping under the appliance.

The review team found that a similar situation occurred at an incident on December 23rd 2017. The appliance could not move due to the brakes being compromised by fire. A service agent was called and had to be protected by another appliance while it was repaired. Firefighters were injured and entries made in the AERIK accident recording system.

Recommendations

1. Review procedure outlining the parking priorities at rural incidences for urban appliances.
2. Fire behavioural specialists to work with federated farmers and Scion to gain information around the farming practices undertaken when re-cultivating very fine mixed crop dry matter back into the soil instead of the typical routine of burn-offs.
3. National Training considers implementing wildfire and vegetation type incidents and fire behaviour and overall situational awareness regarding vegetation incidents into all Urban Officer training programs.
4. A review of refresher training at the Station Officer level to ensure it still reflects the current operational landscape.
5. Fleet considers changing nylon brake lines to the stainless steel braided type onto the rear of all IVECO type 1 appliances.
6. Fleet is to investigate the use of flammable tyre shine products used on operational vehicles by brigades. It is to determine whether or not it affects the ignition and continuous burning of tyres and, if proved to do so, needs to issue a National Notice stating an action or preferred option.
7. All Urban appliances are to be issued a copy of the Rural Fire Management Handbook (Green Book). All Urban officers are to be provided with a pink Dangerous Situations Card.

8. Area Management encourages Urban Officers to attend an Initial Response Incident Controller at vegetation incidents course.

Conclusion

This was a relatively straightforward vegetation incident that brigades regularly attend, although in this case was at an early stage of fire growth.

The OIC performed a size-up, identified hazards, requested further resources and adopted a perceived vegetation flank cutoff. However, unknowingly to him, the fire was burning wider at the head of the fire than initially anticipated. Then, due to a slight wind change, created a curved fire head which happened to now travel in the direction the appliance was located. There is an inherent lack of knowledge by urban Officers in the potential of kW/m of fire intensity in relation to their dynamic risk assessments and ongoing tactical decisions.

The review team identifies the importance of training and upskilling within Fire and Emergency on vegetation fires throughout its "urban arm" of the organisation. As demonstrated at this event, urban Officers attend a significant amount of vegetation fires with little or no understanding of the actual dangers they are facing.

The review team also identified that driving into paddocks and unburnt fuel is common practice. In addition, there has been documented accidents and near misses recorded previous to this one; however, no correlation has been made, resulting in no action to mitigate this.



Instead of getting the next arriving appliance to tackle the burning appliance, the OIC of ASH622 ascertained the appliance was too far gone.

A near miss event occurred when the potential trauma of losing an appliance for the crew was identified.

Review Authorisation

This report has been authorised by Operational Efficiency and Readiness:

Everything in this statement is true to the best of my knowledge and belief, and I made the statement knowing that it might be admitted as evidence for the purposes of the standard committal or at a committal hearing and that I could be prosecuted for perjury if the statement is known by me to be false and is intended by me to mislead.

<p>Trevor Brown Assistant National Commander National Operational Efficiency Manager</p> 	<p>Paul Henderson ANC/Region Manager, Te Ihu Review Sponsor</p> 
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Approved for Publishing



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Appendix 1



Fig 1.0



Fig 1.1



Fig 1.2

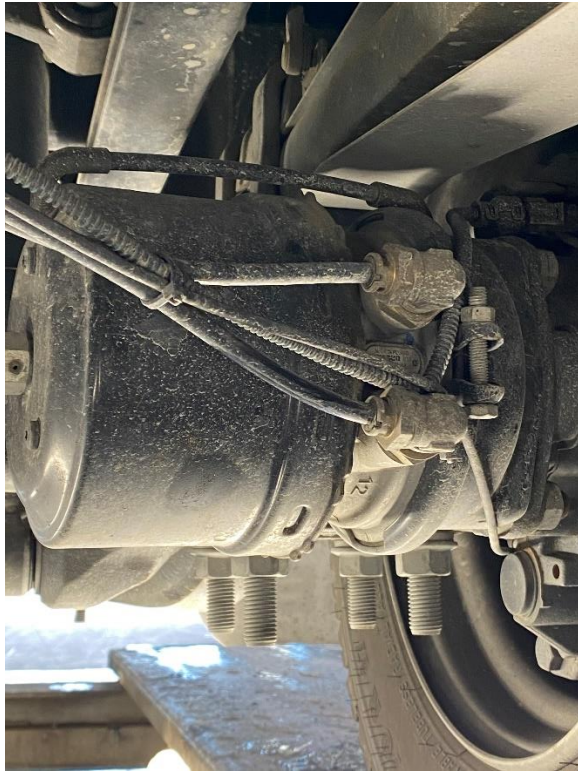


Fig 1.3

Appendix 2

Responses to recommendations:

The recommendations from this report have been reviewed by the identified relevant action owners to understand the impact of the recommendations and to establish if any of these had already been identified within existing work programs or projects.

Recommendation 1.

Review procedure outlining the parking priorities at rural incidences for urban appliances.

Action Owner: Training Programmes & National Training Center Manager / National Manager People & Workforce Capability

Commentary:

Principles for safe parking of appliances are outlined within the Emergency Response driving manual and explained by instructors during the driver qualification course. These principles are necessarily high level as it is impossible to explain every possible parking situation that a driver may face on arrival at an incident. The current general guidance is found in the ERD training Study Guide Page 46 refers to “Driver Procedures -Siting”.

Driving procedures – siting Whenever a fire appliance is sited, due regard must be given to the need for removing it from the site quickly. At emergency incidents the siting of the fire appliance is critical to effective fire ground operations. The person for the time being in charge is responsible for safe siting of the appliance. The following factors should be considered:

- Possible damage from radiated heat.
- Possible damage from structure collapse.
- Maintaining access to driveways for other appliances or vehicles being removed from the site.
- The siting of specialist appliances
- Danger of becoming bogged down.
- Danger from exhausts on appliances starting secondary grass fires.

While there is no specific references to taking appliances off “Hard Standing” in the ERD Training Material. Manager Specialist Courses has advised that the trainers discuss with the students the risks of taking appliances off hardstanding.

That being said, a reference to hard standing is made within the “Pump Operator” training material, Pg 6 and 7

Siting the appliance

Site the appliance in the best possible position to protect people and machinery from hazards. Always evaluate the risks before siting the appliance.

General rules for safe siting of an appliance:

- leave space for specialist appliances, aerial platforms and ambulances
- make sure the pump operator and crew are safe from hazards

New Zealand Fire Service | Training

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Section 1: Pump operator role

- keep clear of fire product hazards and any location where an extension of the fire could put the appliance at risk through heat or smoke
- park on hard standing if you can
- keep away from building collapse zones – at least 1.5 m times the vertical height of the building away
- be aware that water overflow and leaks will make the surrounding ground soft
- park uphill and upwind at hazardous material incidents
- stay within sight of the incident if you can
- site the appliance where exhaust fumes will not create a health hazard or a vegetation fire

Operational Instruction 042/2022 Towing of Fire and Emergency Appliances, addresses the risk of taking a two wheel drive appliance off a formed road, gravel tracks or hardstands and requires that this should not be done.

Recommendation 2.

Fire behavioral specialists to work with federated farmers and Scion to gain information around the farming practices undertaken when re-cultivating very fine mixed crop dry matter back into the soil instead of the typical routine of burn-offs.

Action Owner: National Wildfire Manager

Commentary:

Research to determine if the current fire models remain adequate for predicting fire behavior in this fuel arrangement is programmed to occur in 2022. This will determine if the existing fire behavior models are

adequate or require adjustment for this type of fuel. This research will add to the knowledge base of fire behavior. The extent to which of this type of farming is practiced in New Zealand is not relevant to establishing the fire behavior characteristics of this type of fuel arrangement as farming practices change regularly.

Recommendation 3.

National Training considers implementing wildfire and vegetation type incidents and fire behavior and overall situational awareness regarding vegetation incidents into all Urban Officer training programs.

Action Owner: National Manager People & Workforce Capability

Commentary:

The current Taps program for career firefighters includes a module on special incidents which includes a subsection on vegetation fires and fire behavior in the natural environment, however this is not contained within the current Station Officer Volunteer program. When the current programs are reviewed material on wildfire and vegetation fire events, fire behaviour in the natural environment and situational awareness will be included. This is a scheduled piece of work as part of alignment with incident management framework being developed for Fire and Emergency.

Recommendation 4.

A review of refresher training at the Station Officer level to ensure it still reflects the current operational landscape.

Action Owner: National Manager People & Workforce Capability

Commentary:

In this context refresher training refers to the Volunteer Tactical Command training conducted within district. A review of this material is planned to ensure alignment with the incident management framework once this has been developed. This will include creating a greater situational awareness for officers and firefighters around the risks within the operational landscape particularly for rural / urban interface and the natural environment.

Recommendation 5.

Fleet considers changing nylon brake lines to the stainless steel braided type onto the rear of all IVECO type 1 appliances.

Action Owner: National Fleet Manager

Commentary:

Stainless steel braided type brake lines are commonly used on many types of vehicles for the purpose protecting the line from abrasion damage. The centre core of these lines, carrying the fluid or air under pressure, is still an elastomeric or nylon liner. Protection from heat is not generally a consideration to vehicle (including Fire appliance) manufacturers and a suitable fire exposure rated alternative to the use of nylon (such as insulated hard lines) creates additional concerns related to work hardening, corrosion and increased maintenance. While fire rated flexible braided fuel lines are manufactured, specifically for the motorsport and aviation industry, the costs associated with these materials and the need to use AN type fittings to ensure fire resistance compliance, creates some challenges as a retrofitting alternative. It should also be noted that these are approved for fuel and not necessarily suitable for air or brake fluid. In the wider context, there are a number of other vehicle safety critical service and electrical lines which are underrun of the vehicle chassis which would need to be considered also. This is a consideration for our appliances which principally operate in a off road environment but has not been considered a requirement for predominantly urban response appliances. For new build appliances this will be considered however it is not viewed as a viable retrofit for the existing fleet given the age and need to understand the alternative solutions available and the level of protection that is required.

Recommendation 6.

Fleet is to investigate the use of flammable tyre shine products used on operational vehicles by brigades. It is to determine whether or not it affects the ignition and continuous burning of tyres and, if proved to do so, needs to issue a National Notice stating an action or preferred option.

Action owner: National Fleet manager

Commentary:

Given the described intensity of the fire it is unlikely that the use of any tyre shine product would have significantly altered the ignition characteristics of the tyre. While the product in question has a 3YE Hazchem rating, this rating is a transportation rating for the bulk carriage of the product and not reflective of the end use. This classification would have been required due one or more components of the product being a flammable liquid. Tyre shine is applied as a thin film and the carrier agent (the flammable Liquid component) is designed to evaporate leaving behind a layer of silicone products which provide a slick finish. It is unlikely that this thin layer would significantly influence the ignitability characteristics of the tyre. Scholastic research shows that the ignition characteristics of tyres are such that ignition from radiated heat

followed by direct flame contact can occur very rapidly with a requirement of less than 1.5 kw/M² required. (Ignition of motor tyre samples, H Wraight) Given the advancing flame front was radiating an estimated minimum of 7 kw/m², the rapid ignition and involvement of the tyres seems inevitable. The application of any surface finish to the exterior of the tyre wall is unlikely to make any significant difference to the ignition time for involvement, given the approaching fire size. This is because the product is applied only to the side walls and research suggests that the ignition within the tread is the most common place for accelerated combustion to occur particularly in dual wheel assemblies. It is most likely that the flame front provided pre-heating to the tyres and once the flame front reached the vehicle surface contact ignition would be almost immediate.

Recommendation 7.

All Urban appliances are to be issued a copy of the Rural Fire Management Handbook (Green Book). All Urban officers are to be provided with a pink Dangerous Situations Card.

Action Owner: National Manager Response Capability

Commentary

Printing costs for additional copies of the Rural Fire Management Handbook (Green book) have not been considered within the current budget, however the both the green book and red book have been loaded on the mobility devices within each appliance operating the mobility tablets. It may be possible to also load the pink dangerous situations card into this platform as well and connect this to become a prompt when the appliance is dispatched to a vegetation fire.

Recommendation 8.

Area Management encourages Urban Officers to attend an Initial Response Incident Controller at vegetation incidents course.

Action Owner: Region and District managers

Commentary

These courses are scheduled within the regional training delivery calendar and are available to all staff upon application and endorsement by the District or Group Manager. No barriers exist to prevent urban officers from attending Initial Response at Vegetation Incidents courses. However, there is no requirement to do so and this is the responsibility of the individual to apply for the course. District leadership may need to influence individuals to take opportunities to attend these courses.

Appendix 3

Remedial action plan for addressing recommendations 1-8

Recommendation number	Action	Action owner
Recommendation 1	<ul style="list-style-type: none"> • Include examples of best parking practice within emergency response driver training packages 	Manager Workforce Capability
Recommendation 2	<ul style="list-style-type: none"> • Fire and Emergency Wildfire Fire Scientist will review the existing crop stubble model for its ability to predict fire behaviour in the mechanical harvesting operation used in this incident. 	National Wildfire Manager
Recommendation 3	<ul style="list-style-type: none"> • Ensure that the next review of volunteer Urban Officer training includes wildfire incidents, vegetation fire behaviour and situational awareness. 	Manager Workforce Capability
Recommendation 4	<ul style="list-style-type: none"> • Ensure that vegetation fire behaviour is included within the next review of the Volunteer Tactical Command training to ensure that vegetation fires are captured 	Manager Workforce Capability
Recommendation 5	<ul style="list-style-type: none"> • Vehicle Under side vulnerabilities will be considered in new appliance builds 	National Fleet Manager
Recommendation 6	<ul style="list-style-type: none"> • No action required 	National Fleet Manager
Recommendation 7	<ul style="list-style-type: none"> • Investigate loading the pink Dangerous Situation cards on to all mobility tablets on FENZ appliances. 	National Manager Response Capability
Recommendation 8	<ul style="list-style-type: none"> • Ensure staff are made aware of opportunities to undertake vegetation fire specialization courses 	Region and District Managers