

# FIRE AND RESCUE INTERNATIONAL

Integrated fire, rescue, EMS and incident command technology

Volume 6 No 2



Photo: Dr Berend Maarsingh

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# Comment

This 55th edition of **Fire and Rescue International (FRI)** is jam-packed with thought-provoking technical articles and research for our emergency responders on all levels. Our contributors have spent a lot of time and effort in exploring, researching and writing these articles in order to share their experience and knowledge with our readers. Enjoy the read!



Lee Raath-Brownie

**Cover profile**

South Africa's NSRI has won two International Maritime Rescue Federation (IMRF) Awards ie the IMRF Award for Innovation and Technology and the IMRF Vladimir Maksimov Lifetime Achievement Award.

**National Disaster Management Centre (NDMC)**

The NDMC's Dr Musiwalo Moses Khangale and Ms Matie Losper provide us with information on the District Development Model (DDM) and its opportunities to enhance provision of fire services in South Africa.

**Technical rescue**

The City of Cape Town Fire and Rescue Service' Fred Munnik provides insight on the strategy and specifications of their two new technical rescue vehicles.

**Industrial fires**

The industrial fire features a discussion around non-fluorinated foams by Trevor Fiford while Ingo Weiss of FireDos GmbH shares information on proportioning technology for high-viscous foam agents.

**Training**

The Public Safety Company has refurbished and rebranded the training centre in Modderfontein and is offering the facilities as a neutral, non-competitive training space. We also profile the Pro Ethnos Fire and Rescue Training Centre, which provides emergency fire and rescue services as well as training.

**Fire engineering and safety**

Kobus Strydom of FireLab shares the strategy and results of the first official large-scale test on a multi-storey external façade wall system performed.

**Personal protective equipment (PPE)**

Our PPE feature showcases the recently launched Dräger PSS AirBoss SCBAs.

**Vehicle extrication**

The WRO's Julius Fleischman and Neville van Rensburg discusses the challenges of multi patient extrication and its management strategies while Jim Hamilton of Hamilton Hydraulics shares the recently launched Lukas Jaws of Life® eDraulic 3.0® battery-powered extrication tools operational in both fresh and salt water.

**EMS**

Our EMS feature focusses on ambulance technology and Oliver Wright of SAPAESA looks at how South Africa compares while ambulance builder EVC share their recent designs and innovations.

**Tanker fires**

Our technical expert, Colin Deiner, discusses the complexities of responding to tanker fires, sharing information on legislation, tanker truck construction and the emergency response.

**Fire service leadership**

Etienne du Toit discusses the tools of effective leadership and the importance of training future leaders.

**Wildfires**

Our wildfire feature profiles the Lowveld and Escarpment FPA, we launch the new ICS online game from Dynamic Incident Management, US Forest Services' Chief Tim Murphy discusses frontal assault on a wildfire in Command Corner, Tiaan Pool converses on the placement and location of fire belts, we share the strategies of the recently launched Association for Wildland Firefighters (AWF) and we continue with Chapter 5 from Dr Neels de Ronde's book, 'The Garden Route in flames'.

We thank all our contributors, advertisers and readers for their continued support! Fire and Rescue International is your magazine. Read it, use it and share it!

**Lee Raath-Brownie**  
Publisher



**This month's FRI Images winner!**

**Congratulations to**

Clinton Dilgee for his photograph 'Far from home!' taken with a Huawei P20 cell phone.

**Clinton Dilgee wins this months prize money of R2000!**

**Photo description:**

Recent George Wilderness fires, taken in the Goudveld section of the National Park.

**Well done!**

## Best rescue, fire or EMS photo wins R2 000!

Fire and Rescue International's (FRI) bi monthly photographic competition is open to all its readers and offers you the opportunity of submitting your digital images of fires, fire fighters, disasters, incidents, emergencies and rescues.

**Rules**

- All photographs submitted must be high resolution (minimum 1meg) in jpeg format
- Allowed: cropping, curves, levels, colour saturation, contrast, brightness, sharpening but the faithful representation of a natural form, behaviour or phenomenon must be maintained
- Not allowed: cloning, merging/photo stitching, layering of two photos into one final frame, special effects digital filters
- Fire and Rescue International (FRI) reserves the right to publish (printed or digitally) submitted photographs with acknowledgement to the photographer
- Winners will be chosen on the merit of their photograph
- The judge's decision is final and no correspondence will be entered into afterwards

**Entries must include:**

- Name of photographer
- Contact details (not for publishing)
- Email (not for publishing)
- Name of photograph
- Brief description of photograph including type of incident
- Camera, lens and settings used

All entries must be emailed to:

lee@fireandrescue.co

**>> ENTER NOW!**



# South Africa's National Sea Rescue Institute wins two coveted international awards



South Africa's National Sea Rescue Institute (NSRI) has won two coveted international awards at the International Maritime Rescue Federation (IMRF) Awards ceremony held on 14 September 2021. Stories of dedication, selflessness, bravery and innovation dominated the International Maritime Rescue Federation (IMRF) Awards ceremony. The NSRI won awards in the following categories:

- IMRF Award for Innovation and Technology awarded to South African JetRIB, by Admiral Powercats, Droomers Yamaha and the NSRI
- IMRF Vladimir Maksimov Lifetime Achievement Award awarded to Patrick van Eyssen, Station 3, Table Bay

"We are thrilled that the NSRI's JetRIB Team has won the IMRF's Innovation and Technology Award that recognises new products and technologies developed that improve the work and success of Search and Rescue (SAR) organisations. The NSRI operates in an austere and

resource constrained environment and so innovation is a continuous process to ensure that we adapt and flex to the demands for our rescue services in South Africa. We are overjoyed at being recognized by the international SAR community and with our partners to be able to make a contribution. The JetRIB is an amazing tool for surf rescue," said Dr Cleve Robertson, NSRI CEO.

"We are also absolutely delighted that NSRI stalwart, Pat Van Eyssen of NSRI Station 3 Table Bay has won the IMRF Vladimir Maksimov Lifetime Achievement Award that recognises outstanding service to search and rescue (SAR) by an individual or organisation. There must be very few SAR coxswains in the world that can boast 50 years of operational service without a break. Pat Van Eyssen has been a crew member at NSRI Station 3 Table Bay since the age of 19 years and a rescue coxswain for almost as long! His service is exemplary and it is a true honour to have such a remarkable individual as a volunteer. We are extremely proud of Pat who

remains an active coxswain and serves as a mentor to future crews and continues to make a substantial contribution to the service. He carries our very best wishes to himself, his wife, Jill and children, Patrick, Tracey, Karen and Candice, a truly inspiring family," said Dr Robertson.

The IMRF Awards were established to recognise search and rescue (SAR) professionals around the world for their outstanding actions, skills, expertise and commitment or an innovation/technology that transforms SAR activities.

### IMRF Vladimir Maksimov Lifetime Achievement Award: Patrick van Eyssen

The National Sea Rescue Institute of South Africa was founded in 1967. The first two volunteers used a small Zodiac inflatable craft named Snoopy, driven by a 15hp Johnson outboard engine which was based in Cape Town, which they sometimes transported on their personal Kombi to where they needed to launch for a search or rescue operation.

Four years after the first NSRI volunteers started operating their Zodiac from Three Anchor Bay in Cape Town, 19-year old Patrick van Eyssen, known as Pat, put his hand up and was accepted as a volunteer at the NSRI's Station 1 in Cape Town harbour.

Pat had been involved in boating and fishing from a young age with much of his free time spent on small craft. He is one of those people who has a natural feel for the ocean. Some might say that he has salt in his veins. Pat's brother in law was involved as one of the NSRI's first volunteers and it was not long before Pat was introduced to the organisation, which he took to like a duck to water. Two years after joining, he qualified as a coxswain, a position that he still holds on Sea Rescue's Class 1 off-shore rescue boat.

In the early days of the NSRI the Sea Rescue vessel with the call sign Rescue 1, based at Cape Town, would fairly regularly be asked to respond to incidents at the edge of her range. Sometimes as far as 90 nautical miles off-shore.

It was these long distance rescues, which required precision navigation, well before modern GPS technology, as well as the Air Sea Rescue missions for which he volunteered that kept the young coxswain on his toes. Pat is an exceptional coxswain who has led many successful rescue missions in the treacherous conditions off the coast off Cape Town, South Africa infamously known as "The Cape of Storms."

This year, at the age of 69, Pat van Eyssen is the only NSRI volunteer with an awe inspiring 50 years' active service who is still operational as a duty coxswain.

Pat has twice served as Station Commander of Cape Town's flagship station in the V&A Waterfront. His first stint at the helm of Station 3 was from 2001 to 2010 and after a short break he was re-elected Station Commander in October 2012 to 2016. Pat ran a tight 'ship' or station with great care and kindness. If not actually at the helm of Rescue 1

The BR 800 has an excellent power-to-weight ratio and an anti-vibration system as well



or Rescue 3, Pat always endeavoured to be in the rescue base mentoring and advising those who were at sea and waiting for the rescue crews to return safely to the station. During Pat van Eyssen's time in command, Station 3 carried out 214 operations, rescued 417 persons, towed 61 vessels to safety and assisted a further 261 craft; an indication of the vital part played by this station in assisting persons in trouble off the City of Cape Town.

Over his time of serving the NSRI, Pat has accumulated thousands of hours as a volunteer at sea. He has taken part in 167 rescue operations, most of which he has led as the Class 1 on-scene commander.

There are not many people in the world who have made such an enormous lifetime contribution to the maritime search and rescue sector. The NSRI is greatly indebted to Pat. Not only for his exceptional service but also for all of the people who he has trained to

follow in his footsteps of a life lived in and for search and rescue at sea.

### IMRF Award for Innovation and Technology: South African JetRIB, by Admiral Powercats, Droomers Yamaha and NSRI

Traditional surf rescue vessels that are used world over are either small Inflatables, rigid hull inflatable boats, 3,8 to 4,7 metres in length or jet skis. The National Sea Rescue Institute of South Africa has for a number of years been looking for a replacement for these traditional vessels that would improve crew and patient safety, be as environmentally friendly as possible and still be fast and agile in the surf zone.

They were looking for a vessel that would take propellers out of the water, reducing pollution as well as possible injuries to patients and or crew from prop hits. Ideally the new vessel should have the speed and agility of a jet ski but have better stability and be able to carry more patients.



by the incredible stability of the JetRIB making the loading of crew and patients a lot less stressful in oncoming surf.

The seating position for a crewman on the new JetRIB is behind the coxswain on a soft padded and very comfortable seat, which eliminates the huge impacts experienced on most surf rescue boats that are currently in use.

There is a wave of excitement with regards to rolling the first ten JetRIBs' out to our Sea Rescue stations operating in surf zones around the country.

#### Specifications

- Jet Ski : Yamaha VX 1050 (110hp)
- Hull : Extension hull with a Hypalon pontoon permanently attached
- Engine: Three cylinder, four stroke
- Fuel: 70 litre capacity
- Range: Five hours plus two hours reserve
- Crew: Three

Theresa Crossley, CEO, IMRF said, "The IMRF Awards this year are special, firstly because of the global pandemic, the eligibility period spanned two years and our awards ceremony on 14 September 2021 was an online event and secondly because, despite all the challenges search and rescue teams around the world have faced over the last two years, we have received our strongest set of nominations yet. The judges have had a really difficult task selecting the finalists from an outstanding field of candidates, all with compelling stories and all worthy of international recognition and appreciation."

"My hearty congratulations to Patrick and the JetRIB team. I really couldn't ask for a better team; whether it's our volunteers or professional staff, their exemplary dedication, commitment and passion for everything that we do at the NSRI is the reason that we are able to continue to operate as the only maritime search and rescue organisation in South Africa, funded entirely by donors and sponsorships" concluded Dr Robertson. ▲

pontoons. It is an environmentally friendly engine and being a jet drive, there is no propeller danger to patient or rescue swimmers.

The added hull section has made the JetRIB an incredibly stable rescue platform as well as giving it increased flotation. The pontoons are divided into four separate compartments for safety purposes.

There are many advantages to this new craft. Current surf rescue boats are almost impossible to operate in the surf zone with only the helmsman onboard. On the JetRIB this can be done with ease allowing for two rescue swimmers to be deployed and then picking them and their patient up and running to safety even in challenging surf conditions. These sometimes tricky manoeuvres are made safer

► In early 2019, Admiral Powercats and Droomers Yamaha approached the NSRI with a design concept for a jet boat, a jet ski with an extension hull and hypalon pontoon permanently attached. It seemed to tick all the boxes for an exceptional surf rescue craft and in July 2019 the prototype, given the Sea Rescue class name JetRIB, was taken on a tour of Sea Rescue stations around South Africa.

Feedback from the NSRI's volunteers was unanimous. The JetRIB was reportedly in a class of its own. The consensus was that it will completely change surf rescue work, making it safer for both crew and patient and, equally importantly better for the environment than the two-stroke petrol engines that are widely in use. The JetRIB is a clever combination of the four-stroke Yamaha VX1050 Jet Ski with an extension hull and hypalon

# The District Development Model (DDM): Opportunities to enhance provision of Fire Services

By Dr Musiwalo Moses Khangale, Director: Fire Services and Ms Matie Losper, Deputy Director, Office of the Head, National Disaster Management Centre

The need for a new district-based coordination model was announced during the President's Budget Speech in 2019. The District Development Model was conceptualised and presented to the Joint Cabinet Committee on 13 August 2019 receiving overwhelming support. The DDM was endorsed by the Presidential Coordinating Council (PCC) on 20 August 2019. The PCC supported the 'One Plan' instrument proposed by the District Development Model and emphasised that the One Plan must express the National Development Plan and overlay the Medium Term Strategic Framework (MTSF) priorities, Provincial Priorities and Municipal Integrated Development Plans/Service Delivery Budget Implementation Plans (SDBIPs). The District Development Model was subsequently approved by Cabinet on 21 August 2019.

#### Linkage between DDM and other plans

The District Development Model is an operational model for improving Cooperative Governance aimed at building a capable, ethical Developmental State, including improving and enhancing the state of Local Government. The DDM enables synergy between national, provincial and local priorities and implementation of immediate priority projects and actions as well as a long-term strategic framework for predictable, coherent and effective service delivery and development. It enables implementation of the National Development Plan (NDP), National Spatial Development Framework (NSDF), Integrated

Urban Development Framework (IUDF) and the Medium Term Strategic Framework (MTSF) by localising and synergising objectives, targets and directives in relation to the 52 district and metropolitan spaces (IGR Impact Zones), thereby addressing the challenges of poverty, inequality and unemployment in a spatially targeted and responsive manner.

#### DDM objectives

The aim is to improve integrated planning and delivery across the three spheres of Government with district and metropolitan spaces as focal points of Government and private sector investment. The envisaged integrated planning and delivery in relation to the district and metropolitan spaces will be enabled by a joint planning, budgeting and implementation process. The District Development Model approach has been utilised successfully to coordinate intergovernmental management and response to COVID-19 pandemic focusing on institutional arrangements, district/metro level coordination and monitoring. The DDM focusses on implementation of immediate priority projects, stabilisation of local government and long-term institutionalisation of integrated planning, budgeting and delivery anchored on the development and implementation of the 'One Plan'.

#### DDM One Plans

The One Plan is an intergovernmental plan setting out a long-term strategic framework, consisting of short, medium and long-term actions, to guide investment and delivery in relation

to the 52 district and metropolitan spaces. This plan is meant to be jointly developed and agreed to by all spheres of Government. The District Development Model actions and the One Plan therefore is not formulated by the district or metropolitan municipality but rather as an intergovernmental plan that has to be collaboratively produced jointly by all three spheres of Government. Thus, One Plans as contemplated in the DDM do not deal with the non-strategic aspects that each of the existing plans may cover, neither does it cover the full range of responsibilities that existing plans cover in relation to core powers and functions. They are intergovernmental strategic frameworks that make strategic sense of the available plans and synthesise or localise these plans in the context of the spatial and place making logic of the district and metropolitan spaces.

#### DDM synergy opportunities for Fire Services

Fire fighting is listed as a local government function in Schedule 4 Part B of the Constitution. Currently, the fire service delivery model involves all three categories of municipalities ie metros, local and district municipalities. This system has in some areas, in the context of district and local municipalities been beset with challenges such as (a) Fragmentation in the delivery of services and (b) Duplication of efforts and resources. Thus, the DDM provides an excellent opportunity for integration of strategies and plans to enhance provision of Fire Services into the broader one plan for each district. ►

# Second generation heavy technical rescue vehicles for City of Cape Town Fire and Rescue Service

By Fred Munnik, station commander, City of Cape Town Fire and Rescue Service Training Academy



City of Cape Town Fire and Rescue Service's two new technical rescue units

The City of Cape Town Fire and Rescue Service unveiled 19 new vehicles at the Epping Fire Station in September 2021. The new fleet featured two specialised technical rescue vehicles and 17 specialised water tenders, said to have cost the City's Safety and Security Directorate R81 million to acquire.

During 2007, in preparation as a host city to the 2010 FIFA World Cup, the City of Cape Town's Fire and Rescue Service identified the need to uplift its technical rescue and hazardous materials response abilities. Forming part of this endeavour was the addition of a large technical rescue vehicle to its already diverse fleet of emergency

vehicles. At the time, the most viable option to achieve this was through the refurbishment of an obsolete Metz Turn Table Ladder based on a 1981 Mercedes Benz 1419 chassis. The appliance was deconstructed in view of overhauling the chassis along with all mechanical and cab body components, minus the ladder and hydraulic operating system.

Having a keen interest in the development of the City's hazardous materials and technical rescue service delivery capabilities, Station Commander (SC) Frederik Munnik, station officer at the time, took it upon himself to design and overseeing manufacturing and fitment of a new custom payload body onto the refurbished chassis. This repurposed vehicle was designated the call sign Technical Rescue 1 (TR01) and operationally deployed during September 2008 as the City's first heavy rescue vehicle. ▶

▶ The principle of spatialisation, which refers to the process of translating development priorities and objectives into spatial locations ie district and metropolitan areas, will enable each district, irrespective of whether it has authority to render fire services or not, to have a district wide perspective of fire risks and capabilities required to manage such risks. This will facilitate district-wide implementation of measures to build required capacities and systems in a manner that will enable prioritisation of areas most at risk. Moreover, the District Development Model will enable and enhance joint planning for the provision of fire services by all municipalities within a particular

district in cases where the authority to render the function are at local municipality level.

The establishment of District Development Model structures including at political level, provides an opportunity for all key stakeholders to reflect on the fire risks and required capabilities as part of one plans. The establishment of district/metro hubs as part of the overall institutional arrangements for the implementation of the DDM to provide technical expertise and facilitation provides a platform to effectively coordinate and manage fire services related issues. A District Development Model Hub is defined

in relation to this as a central place where the implementation of the DDM in relation to the respective district/metro space is coordinated at a technical and working level.

The District Development Model provides an opportunity to enhance district-wide integrated planning for the provision of Fire Services by all role players within a particular district. It is envisaged that the DDM will resolve 'silo' planning, budgeting and implementation of Fire Services in a manner that would ensure cohesive service delivery, maximum developmental impact on people's lives, and socio-economic and spatial transformation. ▲



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The total compartmented equipment storage capacity is 28,719 cubic metres

► After some 12 years' service, having had more than her fair share of emergency responses within this new special operations function, TR01 was eventually decommissioned.

Due to the City of Cape Town being an ever-expanding metropole, the need for rendering a technical rescue service did not only remain but increased exponentially. To this end, SC Fred Munnik was again approached to assist in realising the deployment of two new, substantially larger heavy technical rescue vehicles.

Essentially based on the main features of the original design, he set out to improve on identified shortfalls of TR01. Due to the new vehicles being based on a much larger 6x6 wheel drive chassis and having to accommodate a much larger range of equipment, he incorporated some new features within this second round of custom designs. In addition to improving on some smaller features that, at times, may be overlooked during the design and fitment phases, yet impact greatly in the overall functionality of this class of custom built emergency vehicle.

Through the standard tender application process, Ramcom (Pty) Ltd were appointed as the vendor to supply, manufacture and deliver the two new heavy rescue vehicles, in addition to the supply and fitment of various items of equipment. Munnik was greatly assisted by Bruce Martin of Ramcom, who managed to capture and convert his ideas, descriptions and rough sketches into a workable engineering plan. They spent several weeks deliberating on design features and

concepts, measuring and building a database of individual equipment items, drafting and scrutinising an electronic 3D model of the load body and individual components and revisiting initial concepts.

During this time, every millimetre of space available was scrutinised and assigned to the best-suited function, thereby maximising the storage capacity of the load body, improving ergonomic access, removal and restowing of equipment, grouping equipment by not only discipline specific items but also incorporating a clean and dirty locker system to improve on personal safety and equipment care and durability. Currently, there are 857 individual items of equipment stored on each of the vehicles, catering for rescue disciplines such as surface and swift water incidents, vehicle and machinery extrications, rope rescue, confined space, trench and structural collapse emergencies.



The Palfinger PK18500 Performance has a lifting capacity of 8 185kg at 2,00 metres and 570kg at a maximum reach of 18,65 metres

**Vehicle specifications**

The prime mover is an Iveco Trakker rigid 6x6 chassis with front and rear axle differential lock, with all axles having single wheel configuration. Dimensions are: overall vehicle length is 9,2 metres, width is 2,55 metres, its height is 3,3 metres and gross vehicle mass (GVM) of 34 tons. The vehicle has a ground clearance of 380mm with 25 degree approach and 20 degree departure angles.

The engine and transmission drive train is an Iveco Cursor 1- litre turbo charged inline V6 diesel engine delivering 420hp/309kW output with maximum torque of 1900Nm@900rpm and fitted with a rear cab mounted snorkel air intake.

The Eurotronic 16AS2630TO automated 16-speed transmission is fitted with a power take-off (PTO) to drive the vehicle mounted crane. There is a split dual circuit anti-lock braking system (ABS) with electronic brake force limitation (EBL) on the rear wheels and an engine turbo brake. Power assisted steering allows for a turning circle of 19,1 metres wall to wall.

Front and rear eyes/hooks, connected directly onto the chassis, act as secure attachment points. Wrap around style tubular stainless steel bull bar on the front houses a WARN97730 series remote controlled electric winch. Hinged rear under ride protection also acts as

an access step to rear storage area, without affecting the departure angle.

**Cab**

The cab is a three seat cab with air-suspended driver seat and has a multi-functional steering wheel with touch button controls for real time digital dash display as well as an integrated auto reverse camera, GPS and radio system.

**Vehicle lighting and traffic warning systems**

Standard vehicle lighting is enhanced by additional fog and white LED spotlights (gizwag) fitted to the front. The roof mounted 1,6 metre, 22 cluster 200 Watt slimline LED light bar, with 10 additional red flashing LED traffic warning lights placed around the vehicle body, along with the 120dba/200 Watt RMS peak power siren speaker with integrated push-to-talk PA system, can be operated from the microphone control module or vehicle hooter on steering wheel.

The payload body's interior and undercarriage is fitted with LEDs for ground and storage locker illumination.

Two LED work lights fitted above the vehicle mounted crane, along with six LED area lights mounted high onto the vehicle payload body exterior ensure illumination of surroundings work area.

The pneumatically operated Teklite 300E NT telescopic mast light provides additional scene illumination by means of four 32 Watt LED floodlights. The mast light is fitted with a safe stop device, not allowing vehicle movement, forward or reverse, unless properly housed.

**Payload body**

The payload body is constructed of a steel sub frame with an all-aluminium exterior. It is symmetrically proportioned around vehicle centre line, with due consideration to the weight distribution, size and nature of equipment. Payload body dimensions are: length 5,993 metres, width 2,55 metres and inclusive of below chassis bodywork is 2,852 metres in height.



The old Metz Turn Table Ladder based on a 1981 Mercedes Benz 1419 chassis



City of Cape Town's first heavy rescue vehicle, Technical Rescue 1 (TR01) was deployed during September 2008

All nine upper locker compartments are fitted with roller-shutter style lockable closures that are dust and weatherproof. One set of lockers has a through-and-through layout whilst the remaining seven above chassis lockers are enclosed compartments. The rear locker allows access to the internal long timber storage area that runs the length of the load body.

The four below chassis locker compartment doors and the four wheel arch closures act as non-slip access platforms/steps when opened, hereby improving ergonomic access to upper lockers.

Storage lockers include two vertical and eight horizontal roller shelves, six adjustable and five fixed shelves, along with two vertical fixed partitions and a two tier suspended platform incorporating fixed storage shelves for long length items. Individual storage sleeves and a custom storage unit, incorporating a dropdown wall, secure the set of pneumatic shoring struts and extensions.

A rear mounted scaling ladder give access to roof-mounted equipment and the dedicated sheet timber panels' storage locker. Shelving is fitted with custom designed and manufactured brackets to accommodate and secure specific equipment items using either rubber securing clamps or 25mm webbing straps fitted with an innovative spring loaded quick release buckle.

The total compartmented equipment storage capacity is 28,719 cubic metres.

The four corners of the superstructure are fitted with flush fitting recessed handles, along with handles fitted to the interior of lockers and onto roller shelving ensures safe access and secure handholds when removing or restowing equipment.

Chequer plate is used for all kick plates provided at all mud guards, step treads, decking and platform areas to provide non-slip secure footing and protect paintwork.

# Don't have the wool pulled over your eyes when it comes to non-fluorinated foams: Here are the facts

By Trevor Fiford, Industrial Fire and Hazard Control

After more than 15 years of development, manufacturers of fire fighting foam concentrates have still not been able to come up with a product that can be seen as a 100 percent drop-in replacement for the existing AFFF and AR-AFFF foam concentrates in service in the market. Although there are many claims from specific manufacturers that their 'Fluor free' product is the perfect solution, we have come to the realisation that the perfect solution does not yet exist.

There are many factors that come into the equation when looking for

a 'perfect solution'. In our opinion, the perfect solution is when a Fluor chemical containing product can be taken out of the system, the system be purged to get rid of the left over fluorochemicals and a new non fluorinated product can be put in without any further change required to the rest of the system. And we mean from A to Z. From the water supply system through to the discharge device.

And this is where the issue lies. Besides that, we have seen some, let's say, strange behaviour of 'Fluor free' foam concentrates,

like separation or aggregation, so we need to look at all the physical properties as well as performance and application method.

Once it is established that a product is stable and has a long enough shelf life, the required time must be allowed to put the product through its paces by one of the internationally recognised testing houses. Then we can start to see the product's true potential. And here comes the first pitfall: The two main standards used in our industry, the EN1568 and the UL162, look similar but they are from different leagues.

|                                       | Fuel                             | Application type | Foam Application time (minutes) | Pan Size (m <sup>2</sup> ) | Nozzle Flow (l/min) | Test App rate (lpm/m <sup>2</sup> ) | Design App rate (lpm/m <sup>2</sup> ) | Built-in Safety Factor |      |
|---------------------------------------|----------------------------------|------------------|---------------------------------|----------------------------|---------------------|-------------------------------------|---------------------------------------|------------------------|------|
| Hydrocarbons (Water Immiscible Fuels) | UL-162 Type III S category (NFF) | Heptane          | Direct                          | 5                          | 4.65                | 11.4                                | 2.45                                  | 6.5*                   | 166% |
|                                       | UL-162 Type III AFFF category    | Heptane          | Direct                          | 3                          | 4.65                | 7.6                                 | 1.63                                  | 4.1*                   | 151% |
|                                       | EN1568-3 1A Rated Products       | Heptane          | Direct                          | 3                          | 4.50                | 11.4                                | 2.53                                  | 4.0**                  | 58%  |
| Polar Fuels (Water Miscible Fuels)    | UL-162 Type II All Products      | IPA Acetone      | Gentle                          | 5                          | 4.65                | 19.0                                | 4.10                                  | 6.9*                   | 67%  |
|                                       | EN1568-4 1A Rated Products       | IPA Acetone      | Gentle                          | 3                          | 1.73                | 11.4                                | 6.58                                  | 8.0**                  | 21%  |

Significant Pan size reduction in EN on Heptane versus Polar fuels ~ 1/3

\* As per UL or NFPA  
\*\* As per EN13565-2

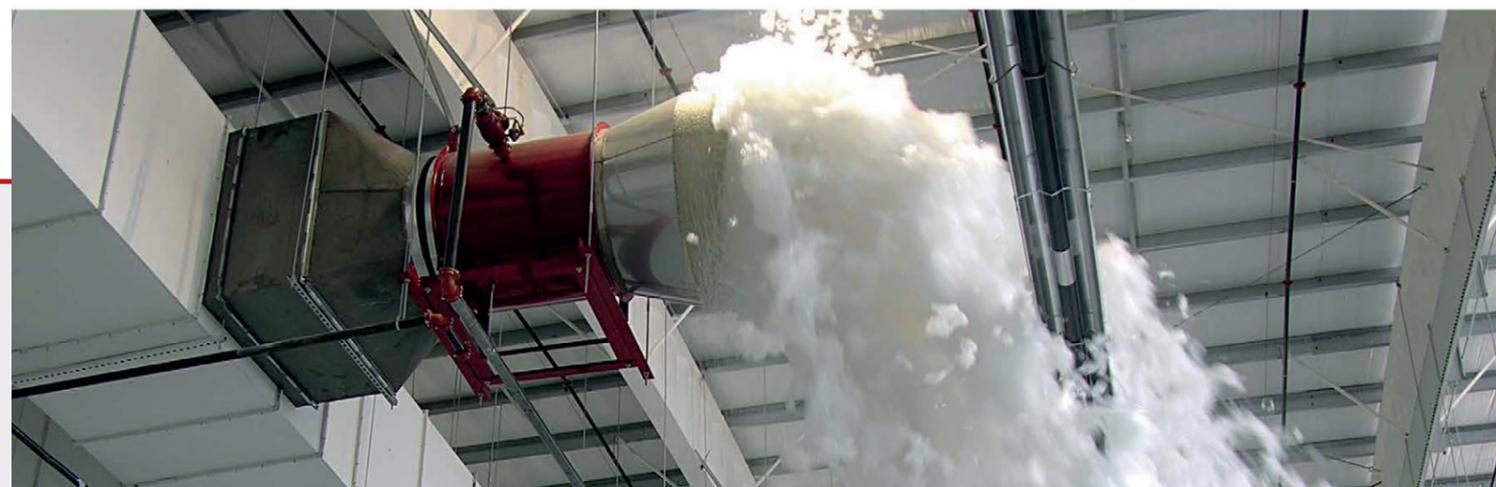
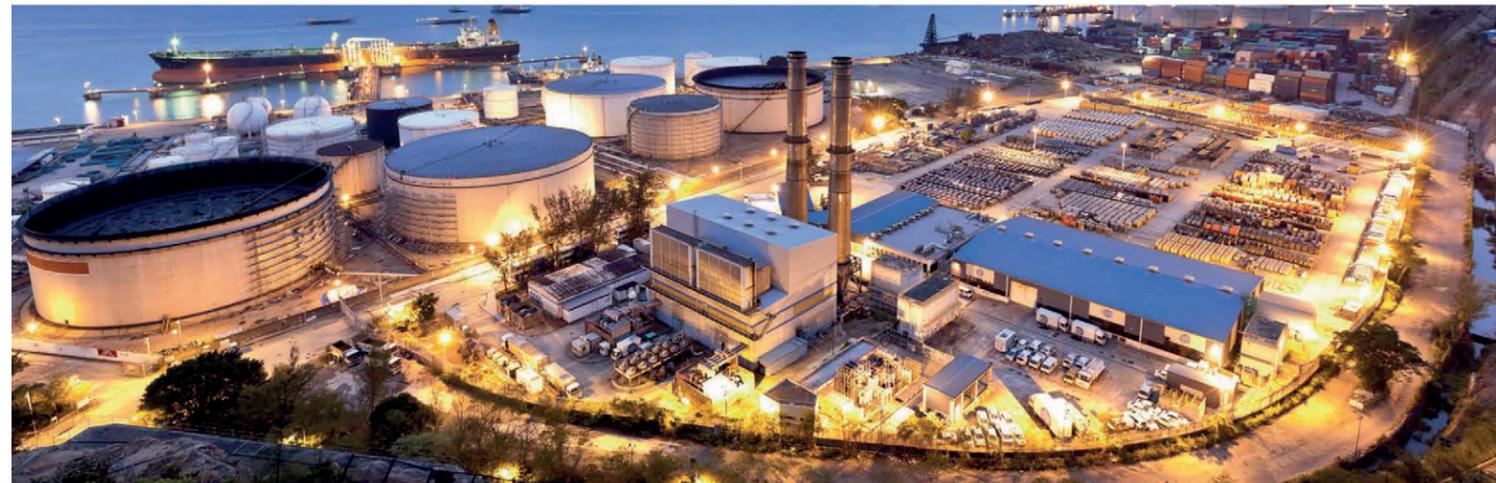
The payload body and locker configuration incorporates a clean and dirty locker principal, thereby eliminating the potential for sensitive electronic equipment, software or other load bearing equipment and compressed gasses being contaminated by or exposed to hydrocarbon fuels or lubricants. This prevents the degradation of compounds and materials susceptible to vapour attack.

A modular storage system allows for easy identification and inventory of equipment, whilst ensuring that related items is stored together. This also promotes easy removal, transport, staging and deployment of equipment items whilst offering protection from weather elements when not stowed and possible damage being sustained under response driving conditions. Certain interior locker areas also

allows for future expansion of the equipment cash.

**Vehicle mounted crane**  
The Palfinger PK18500 Performance has a lifting capacity of 8 185kg at 2,00 metres and 570kg at a maximum reach of 18,65 metres. The 4,8-metre outrigger system ensures good stability and two control console with duplicate operating levers is mounted to facilitate operations from either side of the vehicle.

## Firefighting Foam Suppression Technology



| Test Standard | Application / Fuels                       |  | 3% x 3% AR-NFF       |                        | Status *                        |           |
|---------------|---|--|----------------------|------------------------|---------------------------------|-----------|
|               |   |  | Test App rate lpm/m2 | Listed App Rate lpm/m2 |                                 |           |
| UL-162        | Type III Hydrocarbon Forceful Application | Hydrocarbons (AFFF)                    | 1.6                  | 4.1                    | 3 <sup>rd</sup> party Witnessed |           |
|               |   | Hydrocarbons (Synthetic)               | 2.4                  | 6.5                    | UL Tested                       |           |
|               |   | Premium Gasoline                       | 2.4                  | 6.5                    | 3 <sup>rd</sup> party Witnessed |           |
|               |   | E15 (15% Ethanol / 85% Gasoline)       | 4.1                  | 6.9                    | UL Tested                       |           |
|               | Type II Hydrocarbon Gentle Application    | Hydrocarbons                           | 1.6                  | 4.1                    | UL Tested                       |           |
|               |   | Type II Polar Fuels Gentle Application | Alcohols             | 4.1                    | 6.9                             | UL Tested |
|               |   |  | Ethanol              | 2.4                    | 4.1                             | UL Tested |
|               |   |  | Ketones              | 4.1                    | 6.9                             | UL Tested |
| EN1568:2018   | Part 3 – Heptane                          | Water immiscible Fuels - Low Expansion | 2.5                  | 1A / 1A                | MPA Tested                      |           |
|               | Part 4 – Acetone                          | Water miscible Fuels – Low Expansion   | 6.5                  | 1A / 1A                | MPA Tested                      |           |
|               | Part 4 – IPA                              | Water miscible Fuels – Low Expansion   | 6.5                  | 1B / 1A                | MPA Tested                      |           |
|               | IMO                                       | Msc 1312                               |                      | Pass                   | Internal testing                |           |
| LASTFIRE      | Batch test protocol on Hydrocarbons       |  | Good / Good / Good   |                        | Internal testing                |           |

**Application rate challenge**

The EN1568 part 3 and 4 (low expansion for hydrocarbons and low expansion for polar fuels) with a 1A rating, gives a mere 58 percent safety factor margin between the test application rate and the recommended design application rate for hydrocarbons. This even goes down to a worrying 21 percent safety margin for water miscible fuels.

The UL162 tests at a much lower application rate and comes with a similar design application rate compared to the EN standards. In doing so, UL gives a safety margin between test- and design application rate of over 150 percent for hydrocarbons and 67 percent for water miscible fuels.

There is, however, an unfortunate differentiation in the UL standard here; where EN1568 allows both film-forming and synthetic (non-film-forming) products to be tested at the same rates, UL162 has a separation between the two categories.

The synthetic category (S) is tested with a 50 percent higher test application rate (1,6 lpm/m2 vs 2,4 lpm/m2) and a five minute foam application time compared to the three minutes for film-forming products. This leads to a 250 percent higher volume of foam to be applied during testing (22,7 litres to 56,75 litres).

So even if an UL-listed AFFF or AR-AFFF is replaced by an UL-listed non-fluorinated foam concentrate, there is a design application rate difference between 4,1 lpm/m2 for film forming products and 6,5 lpm/m2 for synthetic products (S) for type 3 application.

Until the UL162 standard will be revised to accommodate for higher performing non fluorinated products, there is no other option to have a foam concentrate witness tested at the AFFF category and, by doing so, give end-users the assurance that the product has an equal fire extinguishing performance to the film forming products with UL listing.

If a product can't be tested at this lower AFFF category, the capacity of the foam system has to be increased by 50 percent. This significant increase goes all the way from water supply to discharge devices; more foam solution on the risk means bigger and more discharge devices, larger piping, fittings, pump and water storage. The cost implications of this glitch in the design standard are huge.

JCI challenged this differentiation and decided to have their non-fluorinated foam agent, the NFF 3x3 UL201 tested against the stricter AFFF/AFFF-AR standard, which they passed with flying colours.

Another test required by our main global customers is the Large Atmospheric Storage Tank Fire Test (LASTFire). Also this test was passed with GOOD/GOOD/GOOD results.

The products' capabilities have been stretched to a realistic scale scenario and successfully tested on a 130m2 tank using a non-air aspirating type nozzle by our partners Williams Fire and Hazard Control. Not only did JCI pass these tests but whilst doing that, they broke another barrier, which was until then not seen before with non-fluorinated foam agents.

**Expansion rate challenge**

The absence of Fluor chemicals in a non-fluorinated foam negates a very important aspect of fire fighting foams ie film formation.

Fluor chemicals gives AFFF and AR-AFFF concentrates their key and unique advantages: oleophobicity and film formation. When the foam is applied to the surface of the fuel it drops into it and rises to the surface. Due to the fluorochemical properties, the foam will barely be affected by fuel contamination. Then a watery film is formed on the fuel surface preventing vapours from burning.

Non-fluorinated foam concentrates don't benefit from this phenomenon. The only way to create a barrier between the fuel and oxygen is to have a robust foam blanket. To

achieve this, you need a higher expansion ratio. The National Fire Protection Association's (NFPA's) in the United States research work done in 2019, suggests that non-fluorinated foam agents may require an expansion up to seven or even 10 to one to reach similar performance of regular AFFF/AR-AFFF concentrates.

Knowing that most, if not all, discharge devices installed have an expansion ratio of around three to five, this means that making the transition to non-fluorinated foam concentrates also means the change-out of the discharge devices. Or in case of type 3 direct application with mobile monitors the throw length, which is basically the safety distance, is reduced by almost 20 percent.

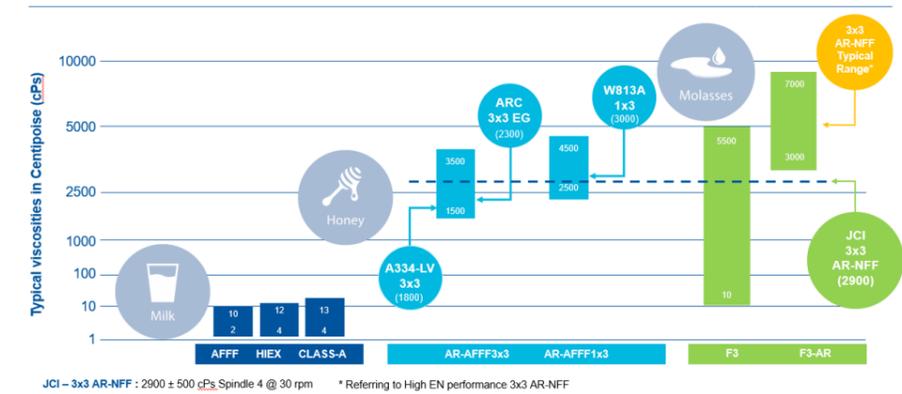
Without adding fluorochemicals, the recently launched Tyco NFF 3x3 UL201 passed the above mentioned stricter UL AFFF/AFFF-AR test at an expansion ratio of three to one on hydrocarbons.

**Proportioning challenge**

Another issue that is faced by the industry is the proportioning of these new non-fluorinated foam concentrates and their viscosity. This viscosity is typically much higher than regular AR-AFFF concentrates. Between two to five times higher for the alcohol resistant types are no exception; this might create problems with proportioning accuracy. Whatever proportioning type is used, re-certification and/or re-calibration will be required.

Thus make sure when making the transition that the selected non-fluorinated product has an acceptable viscosity so it will work seamlessly with your foam proportioning system.

**Foam Properties: Viscosities of AR-NFFs**



The development target applied by Tyco for the NFF 3x3 UL201 was to give this product viscosity properties similar to other high quality AR-AFFF 3x3 products available in the marketplace.

**What's next?**

Choosing the right non-fluorinated foam concentrate is only one step in the transition away from fluorinated products.

It is not going to be a simple and easy journey. Making sure that you can hold onto your existing system as much as possible is paramount. Replacing the foam agent without taking all of the above into consideration will lead to significant cost and downtime to increase the system's capacity, proportioning and/or discharge devices.

Bear in mind that a 50 percent increase in application rate ie from 4,1 to 6,5 litres per minute per square metre for an average sized area like 1 600m2 (a pump pit, diked area or 45m diameter tank), leads to the following numbers: (table below)

This means a significant increase of the water and foam concentrate storage, pump size, the piping, the

proportioning system, valves and discharge devices.

This all sounds extremely logical but we have seen many instances where all these factors were not taken into consideration and the end user ended up with a system, which wasn't capable to do the job it was initially designed for.

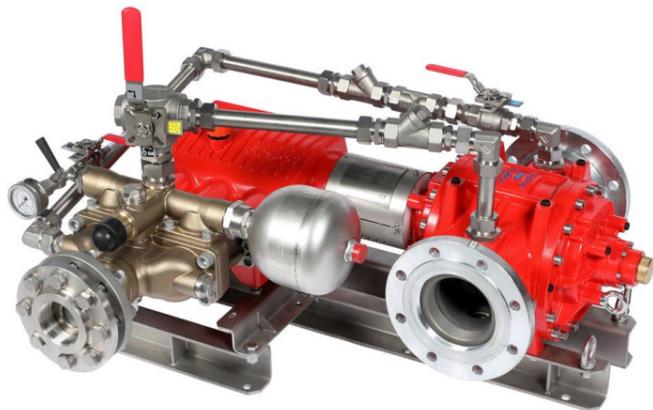
Last but not least, if local legislation is in place for the phase out of fluorinated products, it will be with certain thresholds on PFOA/PFAS/PFHxA levels. These levels determine the cleaning work to be executed in your existing systems. When these thresholds get to Parts per Billion level (PPB), it means that any trace of fluorinated product in your system might still lead to violation of the local regulations. Therefore, there is not one global guideline for this transition. It all depends on regional requirements. Whether you are in Europe or Africa, in the USA or South East Asia, a bespoke solution has to be applied.

As always, you can reach out to us whenever you need more information or support on your foam related issues. ⚠️

|   |       |        |        |
|---|-------|--------|--------|
| Application rate                                | 4,1   | 6,5    | lpm/m2 |
| Required flow                                   | 6.560 | 10.400 | lpm    |
| Required water volume (30 min application)      | 1.968 | 3.120  | m3     |
| Required foam agent volume (30 min application) | 5.904 | 9.360  | litre  |

# Proportioning technology for high-viscous (alcohol resistant and fluorine-free) foam agents: Things to consider

By Ingo Weiss  
Head of sales, FireDos GmbH, Germany



The higher the viscosity, the less fluid is a liquid. The lower the viscosity, the more fluid it is. With the viscosity of foam agents, it is distinguished between:

- Newtonian fluids, eg the low-viscous extinguishing agents AFFF, Hi-Ex, Class A and multi-purpose foam agents and
- non-Newtonian fluids, ie pseudoplastic foam agents such as AFFF-AR and FF (fluorine-free foam agents).

The foam agent to be selected depends on the type of intended use or the risk to be protected from. Is it about flammable solids or about fluids? Polar fluids require different foam agents for extinguishing than non-polar fluids do. Also, the depth of the fluid is one decision criterion.

### High-viscous foam agents: Which proportioning technology is the right one?

The viscosity of foam agents has a major influence on the correctness of proportioning. Highly viscous foam agents have a significantly higher pressure loss while flowing than low-viscous foam agents do. This rules many proportioning technologies out that are based upon pressure ratios. In turn, such proportioning technologies are suitable where the high-viscous foam agent is delivered by pumps. A grave concern as air entrapment is the biggest problem when handling high-viscous foam agents, displacement pumps are the only suitable pump type suitable for decanting from the supplier container into the proportioning systems foam tank. Off-the-shelf barrel pumps are not suitable as too much air would be trapped during transfer. The high viscosity liquids would prevent this air from escaping, making the foam agent useless. It is important to inspect your delivery prior to decanting to ensure the delivered goods do not already have air entrapped.

### Requirements to the foam agent pump: The suction line is what really matters

The foam agent's viscosity influences the pressure loss of a pump significantly while flowing through the suction line. The correct dimensioning of the suction line is therefore crucial for correct proportioning of the foam agent. When considering the most important operating parameters of a pump, the correlation between foam

agent viscosity, pump suction capacity and the suction line diameter, becomes clear:

### NPSH value

Every pump has a specific net positive suction head (NPSH) value, also referred to as suction capacity. The value can be taken from the manufacturer's datasheet. It depends on the pump type and the number of revolutions. Putting it simply, the NPSH value is the negative pressure or the pressure drop that the pump generates inside the suction nozzle.

### Volumetric efficiency

Flow rate actually delivered in relation to flow rate theoretically delivered.

### Dimensioning of the suction line for the foam agent pump

Two limitations must be considered when dimensioning the suction line: Firstly, the maximum permissible flow velocities and secondly, the pressure loss in the suction line.

### Flow velocity

Depending on their viscosity, foam agents have different maximum permissible flow velocities. For foam agents with a viscosity similar to water, which is independent of the state of movement (Newtonian fluid, eg AFFF foam agent), a flow velocity of 1,0 to 1,2 metres per second in the suction line should not be exceeded. For pseudoplastic foam agents with a viscosity depending on the state of movement (non-Newtonian fluid, eg AFFF-AR foam), a flow velocity of 0,6 to 0,8 meters per second in the suction line must not be exceeded.

Exceeding the permissible flow velocities may lead to evaporation of foam agent components and the hazard of explosion-like increase in volume, showing as a pressure surge (causing cavitation).

### Dimensioning of the foam agent suction line

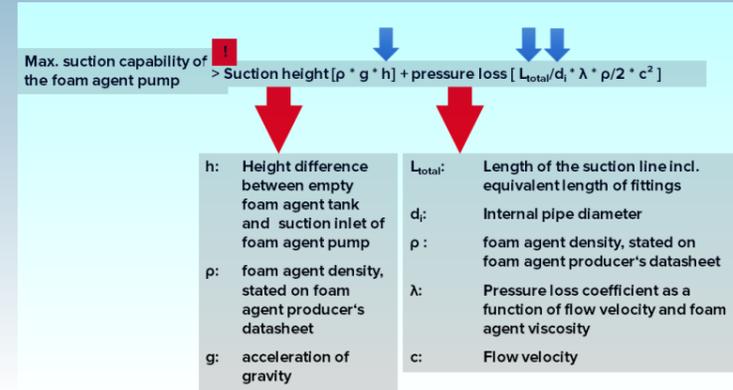
The suction line of a foam agent pump must be dimensioned in such a way to take pressure losses under different operating conditions into account:

- minimum/maximum expected water flow rate
- minimum/maximum expected foam agent temperature in the suction line

When calculating the dimensioning of the foam agent suction line, several factors must be considered. This includes the height difference between the foam agent tank and the foam agent pump, the foam agent density, acceleration of gravity, the length of the suction line as well as the pressure loss coefficient as a function of the flow velocity and the viscosity of the foam agent and finally the flow velocity.

The following factors for the suction line layout can be influenced:

- h, the height difference between foam agent tank outlet and foam agent pump inlet



This formula can be used to calculate the dimensioning of the foam agent suction line between tank and pump.

- L<sub>total</sub>, the length of the suction line
  - di, the diameter of the suction line
- No pressure loss calculation can be made without indication of viscosity since the pressure loss coefficient is calculated as follows:

However, not only the correct dimensioning of the suction line is crucial. To avoid faults in the delivery of

FireDos foam dosing proportioners and skids • Monitors and water cannons • Mobile dosing and monitor trailers • Bund, tank top and rim pourers

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- Newtonian fluids
- e.g., AFFF, Hi-Ex, Class A, MPFA...
- Non-Newtonian, pseudoplastic foam agents
- e.g., AFFF-AR and FF



• Low viscosity



• High viscosity

Distinguishing foam agents by their viscosity

# Gauteng's Modderfontein fire training ground gets new lease on life



The old fire training ground in the heart of Modderfontein in Johannesburg, South Africa, has been refurbished and rebranded FTC Modderfontein.

Under The Public Safety Company, the venue has been repositioned as a neutral, non-competitive training space available to training organisations and companies looking for a purpose-built facility that caters to the needs of multiple fire, rescue and emergency medical disciplines.

"The private training space has evolved over the last few years with prospective students spoilt for choice",

says Iain Fourie, managing director of The Public Safety Company. "But what most private companies seem to lack is a suitable training space. So rather than enter that market, we've seen a gap to play a supporting role in making the space available to all." With the challenges faced by municipal facilities and increased bylaw enforcement around pan fires in office block parking lots, the market gap is significant. "We're confident that with well-priced access to FTC Modderfontein, the industry as a whole will have a chance to level up and improve standards across the board."

The facility has a 900sqm hot zone for live fire training on a central stack structure, various sizes of fire pans, a pressure vessel and a fuel tanker. The 16m four-storey tower is available for rope access and high-angle rescue training. The property size has increased by 4 000sqm and a large area is demarcated for trench rescue training. A unique 60sqm 'smoke house' with a rat cage and movable walls, is able to provide search and rescue training in real or synthetic smoke.

As part of the venue upgrade, the oil separator on the property was restored and a second stage separation and filtration system has been installed. This allows for water reclamation on site and a tank farm has been added to the property to increase water storage capacity to 45 000 litres.

A small fleet of fire appliances is available to aid with pump training and the next phase of the project will be to equip the campus to better serve clients.

"The other big issue private colleges face is the prohibitive cost of good equipment", highlights operations manager Nic Bruchhausen. "Over the next 12 months, we'll be adding to our inventory monthly and the eventual goal is to be able to provide all of the equipment available for training to local and international standards as part of the venue rental."

FTC Modderfontein is also available for product launches and demonstrations. 🔥



► the foam agent through the foam agent suction line, the following should be observed:

$$Re = d_i * \frac{c}{\gamma}$$

*Re* Reynolds number  
*d<sub>i</sub>* Internal pipe diameter  
*c* Flow velocity  
*γ* Dynamic viscosity

For *Re* smaller than 2350 (laminar flow):

$$\lambda = \frac{64}{Re}$$

For *Re* larger than 2350 (turbulent flow):

$$\lambda = \left[ 2 * lg * \left( Re * \sqrt{\frac{\lambda}{2,51}} \right) \right]^{-2}$$

Calculating the pressure loss coefficient

- The suction line should be constructed as easy, short and straight as possible. Non-steady piping layouts and blind lines should be avoided.
- Also, a common suction line for several tanks as well as a common suction line for several foam pumps should be avoided.
- In addition, attention should be paid that the foam agent tank connection and all fittings in the pipework have the same size like the suction line itself.
- Furthermore, the suction line must be vacuum-tight (no pressure test).

## Conclusion

Viscosity is the most important physical property of a foam agent with regard to proportioning and is decisive for its possible application in the case of a fire. Highly viscous foam agents can be applied efficiently only if the proper proportioning technology, based upon pumps, is used. The correct proportioning of a foam agent depends on the dimensioning of the foam agent suction line. Apart from the correct calculation of the dimensioning, many more parameters must be observed. In practice, it must be ensured eg by short and straight lines that nothing can compromise the delivery.

## FireDos GEN III proportioner

With GEN III, FireDos offers a complete proportioner type series for the delivery of highly viscous foam agents. GEN III is a hydraulic-driven foam agent proportioner for fire fighting. The compact and sturdy system is suitable to handle all types of foam agents, even extremely high-viscous, alcohol-resistant and fluorine-free foam agents. In addition, GEN III allows cost-saving and eco-friendly testing of the proportioning rate while no foam is produced, no foam agent is used and no premix has to be disposed of.

DoseTech (Pty) Ltd celebrates 32 years of business this year, first introducing FireDos proportioners into the Southern African market since 2000, with a large number of systems successful installed. ⚠️

# FIRE TRAINING CENTRE

FTC Modderfontein is a unique non-competitive space for fire, rescue and emergency medical training and related product launches, training and events.

Based in the heart of Modderfontein, the venue is easily accessible & boasts a multifunctional lecture / launch space, 900m<sup>2</sup> of hot zone space with multiple props, a 60m<sup>2</sup> SmokeHouse, a 16m tower and over 1,000m<sup>2</sup> manicured lawns.

For more like us at [www.facebook.com/ftcza](https://www.facebook.com/ftcza) or email [ftc@publicsafety.co.za](mailto:ftc@publicsafety.co.za)



# Pro Ethnos Fire and Rescue Training Centre provides practical and online training



*“Our training methodology is based on theoretical class work and assignments, practical training and road practical experience”*

for individuals to obtain training previously only possible at higher cost and selective institutions. Fire and Rescue International spoke to Jurie van Staden, director of operations at Pro Ethnos Fire and Rescue to find out more about their offering.

### Accreditation

The training programme is aligned to meet the SAQA requirements, while also maintaining a skill level equal to the NFPA programmes. The programmes are re-assessed annually or when new techniques are tested and on recommendations of a number of USA focus groups.

Pro Ethnos Fire and Rescue holds accreditation with Local

South Africa including municipal, Government, aviation and industrial fire departments.

Pro Ethos Fire and Rescue Training was created to provide cost effective, high-quality training to individuals involved in volunteer organisations. The core focus is to provide a place

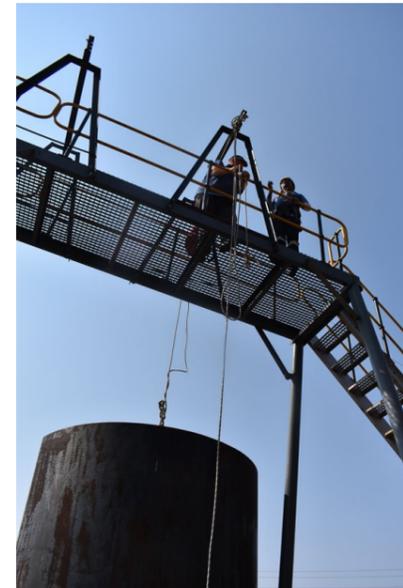
The Pro Ethnos Fire and Rescue Training Centre is situated in Sundra, Mpumalanga and provides emergency fire and rescue services as well as training. Pro Ethnos Fire and Rescue was first established in Utrecht KwaZulu-Natal in 2012 but relocated its campus to Rietkol, Sundra in Mpumalanga, on the Gauteng border, in 2019. Pro Ethnos Fire and Rescue Training was registered in 2015 as a Pty Ltd; the company was previously known as Pro Ethnos Services that was registered in 2012.

The training centre is co-owned and managed by Jurie van Staden, whose employment history includes multiple private medical and fire services as well as hazardous material services.

Pro Ethnos has six part time instructors and, between them, have over 80 years' experience ranging from a wide array of services in



The ProEthnos Team



Government SETA for the full Further Education Training Certificate (FETC) and Rescue and the National Certificate Supervision; Fire and Rescue Operations, with their main accreditation with Transport Education Training Association (TETA).

### Training facilities

Pro Ethnos has one lecture room able to seat 12 to 14 students and five store rooms. They also have personal protective equipment (PPE), hardware such as positive pressure ventilation (PPV), chainsaws and hoses, a self-contained breathing apparatus (SCBA) service and refill, a fire extinguisher service and refill and a workshop. “Our hydrant system includes operational deluge sprinkler system, hose reel, Storch coupling hydrant, standpipe head hydrant as well as two normal hydrants”, said van Staden.

The training centre has a drill platform for students to attend parades and there are also two dummy hydrants for hose drills. The training centre’s platform is also used for fitness evaluations. Other structures include a basement fire simulator attached to the structural fire simulator, the liquefied petroleum gas (LPG) and transformers simulator, vehicle fire simulator, smoke room, petrochemical fire simulator, second storey bail out window, Denver and Pittsburgh drill simulator, vertical tank for vessel entry and rescue, Hazardous material simulator including pipe rack, plug and patch drum and a fuel pump leak simulator.

Pro Ethnos Fire and Rescue has trained over 500 students

since 2015. “We limit our class ratio to five to eight students to one instructor. Our curriculum includes fire and rescue subjects, including the full Further Education Training Certificate (FETC), Firefighter 1 and 2 and the National Certificate Supervision. Subject includes 14 rescue modules ie rope rescue, light and heavy motor vehicle rescue, confined space and trench rescue, marine and swift water rescue, aviation fire and rescue, collapse, trench and wilderness search and rescue”, said Van Staden.

Fire subjects include the full Fire Fighter 1 and 2 programme and they also provide Fire Safety Inspector, Fire and Rescue Supervisor (Fire Officer 1), Foam Operations and Ventilation Training.



## Pro Ethnos Fire and Rescue Training

Fire, rescue and hazmat training

Tel: 013 854 0210

Email: [responce@proethnosfire.co.za](mailto:responce@proethnosfire.co.za)

[www.proethnosfire.co.za](http://www.proethnosfire.co.za)



Training also includes the Hazardous Material Awareness Level, Hazardous Material Operation Level and Hazardous Material Supervisor (Technician Level).

Pro Ethnos Fire and Rescue also offer workshops in forcible entry techniques, rapid intervention training, thermal imaging, hazardous material rescue and rapid intervention team training (RITT).

“Our training methodology is based on theoretical class work and assignments, practical training and road practical experience for our long term students as part of our volunteer programme, Pro Ethnos Volunteer Rescue Squad Co. Our belief is that the class room provides a base for what should be taught in the practical and that true training can only be achieved through live fire training and practical hands on experience”, said Van Staden.

Pro Ethnos also offers international online fire training through a registered partner in Texas in the USA.

Pro Ethnos has a pass rate of between 60 to 80 percent per class with a required pass mark for final written assessment of 75 percent.

Van Staden added, “Our trainees’ ages range from 18 to 48 with the greater number of students being between the ages of 25 to 38.”

“We assist students to obtain employment through recommending students who has achieved the required outcomes to a wide range of our clients that has private services. On average, we are able to assist between 60 to 80 percent of our unemployed students to obtain employment.”

Pro Ethnos offer students the opportunity to obtain skills in real life training environments, although a high quality theory is trained students are equipped and trained through hands on training in the situations that they may encounter, Pro Ethnos Offer the type of training that will push a student to realise their potential. ▲



# First official large-scale test on a multi-storey external façade wall system performed at FireLab

By Kobus Strydom, managing member, FireLab



The first official large-scale test on a multi-storey external façade wall system was tested in May 2021 at FireLab at the Council for Scientific and Industrial Research (CSIR) in Pretoria, South Africa. This test was commissioned by Terraco South Africa for testing the EIFS Alpha System in conjunction with the nominated and certified insulation supplier Technopol (Pty) Ltd, manufacturer of certified fire retarded expanded polystyrene and mineral wool fire breaks.

The test was conducted following the growing concern regarding the fire safety of high-rise buildings

constructed in South Africa preventing similar incidents to that of the Grenfell Building in England. The test was conducted in accordance to the recently adopted British Standard 8414, which now form part of the National Standards in South Africa.

The Terraco EIFS Alpha System tested was an insulated external cladding for multi-storey buildings. In terms of the new energy regulations, external walls and roofs of buildings must comply with the energy requirements with regard to insulation. The reason is to provide acceptable insulation from hot external conditions during summer and cold conditions during winter to

cut down on the energy (cooling and heating) requirements.

The purpose of the test was to determine the external fire performance of a non-loadbearing insulated composite external cladding system. The cladding system may include glazed elements, infill panels, insulated composite panels and site assembled systems fixed to and supported by a structural frame or a fire rated non-loadbearing walling system inside the building edge. The fire resistant properties of the framing and wall system are tested separately and must meet the fire resistant ratings as set out in the

► National Building Regulations, SANS 10400-T, Fire Safety.

The principal purpose of the test method was to enable the overall fire performance of the external cladding system, in combination with the relevant substrate wall system and its relevant components, to be assessed as a complete external wall system test as far as practical possible. The test facility allows external cladding systems to be installed close to typical end-use conditions and allows variations in the in the support frame and/or non-loadbearing wall on the edge of the building to match the installation as would be done in practice.

**Test criteria**

The primary concern is the spread of flame away from the initial source (fire source) and the rate of fire spread. If the fire spread away from the initial source occurs, the

rate of progress of fire spread or the tendency for collapse should not unduly hinder intervention by the emergency services. Therefore the performance of the system investigated is evaluated against the following three criteria:

- External fire spread (vertical and lateral)
- Internal fire spread (in the absence of an internal fire resistant walling system)
- Mechanical performance (stability of the installation with regard to collapsing and falling debris).

The following international performance standards were used for the evaluation:

- BR 135 – BRE (England and Wales)
- LPS 1852 – BRE Global Ltd
- AS 5113 – Australia

**Conclusion**

The Terraco EIFS Alpha System insulated cladding performed well and

met all the respective requirements as set out in the performance standards above. The maximum temperatures recorded at level 1 (2 500mm above the ignition source) and level 2 (5 000mm above the ignition source) was approximately 600 and 200 degrees Celsius, which reflect a clear indication of no vertical spread of fire.

The system also stood up well from a mechanical point of view as no debris was dropping down during the test duration. Observations made after the test when the external plaster were removed, showed that the insulation in the system performed well and also the importance of fire breaks in the insulation to limit the possibility of a cavity fire spread.

No internal fire spread was noted as a result of the correct fire resistant internal walling system used for the support of insulated external installation.

The Terraco EIFS Alpha System insulated cladding performed well and met all the respective requirements as set out in the performance standards



# Breathe easier while fighting fires

The Dräger PSS AirBoss is one of the lightest self-contained breathing apparatuses in its class

Dräger recently launched its PSS AirBoss self-contained breathing apparatuses (SCBA), which offers more comfort, higher visibility and is easier to clean. The new PSS AirBoss SCBA for fire fighting operations is light weight and adjustable for better wearing comfort and works with the Dräger FireGround automatic accountability and monitoring system.

The Dräger PSS AirBoss is one of the lightest self-contained breathing apparatuses in its class, which guarantees optimal respiratory protection even under the most difficult fire fighting operations. "With the PSS AirBoss, we are introducing a new self-contained breathing apparatus that has been optimised primarily in terms of comfort, operational safety and connectivity," explained Dräger product manager, Ian Bell. "Wearing a self-contained breathing apparatus is physically straining for the fire fighter. That's why we wanted to design a device that was as light as possible and make it easier to wear by optimising the

ergonomics." These ergonomic features include a rotatable and sliding lap belt and a height-adjustable carrying system. Together with the low weight of the self-contained breathing apparatus, the physical strain on the user has been reduced. The PSS AirBoss also offers various options for positioning additional equipment, such as thermal imaging cameras and rescue hoods on the shoulder straps and lap belts.

### One of the lightest compressed air cylinders on the market

The Dräger Nano fully composite type 4 cylinder further reduces the weight carried during dangerous firefighting operations. The cylinder body has a weight of 2,8kg (6,8 L air/300 bar including impact-resistant caps). This currently makes it one of the lightest compressed air cylinders on the market. A regulator hand wheel is used to fit and remove the cylinder easily. A new universal cylinder strap with a buckle ensures that the cylinder can be replaced quickly and that the self-

contained breathing apparatus is safely positioned. One or two compressed air cylinders can be fitted on the apparatus.

### Increased safety

The PSS AirBoss has large reflective elements that increase the wearer's visibility. In addition, the self-contained breathing apparatus can be equipped with a personal warning and safety system. A motionless detector uses visual and acoustic signals to draw attention to fire fighters at risk, eg in the event of a fall, immobility, low cylinder pressure or high thermal stress. An additional head-up display keeps fire fighters constantly updated with information on air consumption.

### Lots of networking options

The Dräger PSS AirBoss can be connected to the Dräger FireGround automatic accountability and monitoring system. This gives the officer in charge live information about those wearing the respiratory protective devices and ensures that there is constant tracking of this information during an operation. ▲

Dräger PSS® AirBoss

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Advertisement

# Lukas Jaws of Life® launches eDraulic® 3.0 extrication tool line



*Lukas is continually evolving the Jaws of Life extrication tools to make first responders' jobs safer, easier and more efficient*



**L**ukas Jaws of Life® introduced eDraulic 3.0®, taking its fastest and most powerful battery-powered extrication tools and making them faster, operational in both fresh and salt water. And now, it also features the smartest through a smart dashboard display, which provides operators with real-time feedback on tool status. "Lukas is continually evolving the Jaws of Life extrication tools to make first responders' jobs safer, easier and more efficient and eDraulic 3.0 takes tool innovation to a whole new level," said Jim Hamilton of Hamilton Hydraulics in South Africa.

"With the launch of E3, Lukas Jaws of Life has taken the fastest, most powerful tools in the industry and

made them also the smartest, giving first responders an at-a-glance dashboard for tool performance that allows them to keep their focus on the patient," said Hamilton.

"The tools can operate underwater to a depth of three metres with an operating time of 60 minutes on the 9Ah battery," added Hamilton.

The Lukas E3 smart tool dashboard provides the tool operator with live, visual and easy-to-see tool feedback in three key areas: roll warnings, which assist the operator with cutter positioning; power level indicator, which alerts the user to real-time power level, so they can reposition the tool for another

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# Multi patient extrication: Your destination is reward for safe driving

By Julius Fleischman and Neville van Rensburg, World Rescue Organisation (WRO) assessors and members

**A**wareness is the key to safety at accident scenes. Knowing the hazards and how to work around them will ensure the safety of everyone. An accident scene can be a hectic place with a lot of things going on at once. Accident scenes are often chaotic and difficult to secure with so many people coming and going. No two accident scenes are alike but they share the same goal - everybody should get home safe and sound.

Whenever you step onto a bus, whether a city bus, a tour bus, a shuttle, a school bus, etc, you are entrusting your safety to the bus driver and the owner of the bus. For some reason, we feel safe

and secure on a bus; so much so that many busses do not have or require seat belts. The driver of the bus is not only confronted by the challenges from road and environmental conditions but also the lawless and reckless road users, both human and animal!

But even when in a bus, accidents do happen.

When involved in a bus accident, the consequences can be significant, possibly even more so than a typical car accident. There are more victims, more responsible parties and injuries can potentially be much more serious because of the lack of safety equipment like airbags and seatbelts.

Every day in every community, large vehicles travel the road filled with potential patients: some children, some elderly, some with special medical issues, all are potentially your responsibility. These mass casualties on wheels present a host of problems for EMS responders.

If you're the head of your agency, you may wonder how you can prepare your system. If you're a frontline supervisor you may wonder what tools you should have on hand to manage such an incident. If you're a field provider you may wonder what you can do to prepare yourself for response.

Bus collision incidents may be inherently complex but the

adds increased user-controlled speed and the tool's patented watertight design allows operation in both fresh and salt water.

The Lukas Jaws of Life eDraulic 3.0 debut includes 11 tools ie SP 555 E3 spreader, SP 777 E3 spreader and SP 333 E3 spreader, the SC 358 E3 combi, SC 758 E3 combi and the SC 258 E3 combi, the S 799 E3 cutter, S 378 E3 cutter and the S 789 E3 cutter as well as the R 521 E3 ram and the R 522 E3 ram.

Other features and benefits of Lukas Jaws of Life eDraulic 3.0 rescue tools include a brushless DC electrical motor for more efficiency and performance, an ergonomic design, LED lights and an optimised weight. All Lukas Jaws of Life tools meet NFPA 1936 2020 standards for NFPA performance ratings.

All Lukas vehicle extrication tools are available from Hamilton Hydraulics, its sole distributor for South Africa. 

techniques to manage each part are simple so that they can be used quickly and with confidence.

### Challenges for EMS

Even minor bus collisions can present a variety of scene management issues including accident investigation, traffic flow, secondary collisions, rescue and extrication, interagency communication, hazardous materials release, cargo security, media and bystander management and, of course, patient care.

The key to successful management of a bus collision incident is to break the larger incident into smaller, more manageable chunks.

The three primary issues responders face can be quickly categorised as:

- Lots of patients
- Lots of problems
- Lots of partners.

Details will vary depending on needs, resources and conditions specific to each incident but broadly categorising patients, problems and partners will make it easier to begin to delegate, coordinate and take action to resolve the incident.

The first thing to consider at all bus collisions is the large number of potential patients. Although the number may range from fewer than 10 to more than 100, effective use of an mass casualty incident (MCI) system will streamline prioritised patient assessment and treatment and continue the forward movement of patients. This forward movement will help get patients to definitive care, reconnect them with friends and loved ones and resolve the overall incident faster.

Keep in mind that all the incident problems one might encounter at a motor vehicle collision (MVC) may be present and at a much larger scale than usual. These may include having to work in areas with foul weather, unstable surfaces, physical hazards such as broken metal and glass and downed power lines, as well as hazardous materials from the vehicles.



Even minor bus collisions can present a variety of scene management issues

As with any MVC, EMS providers must remain aware of the hazards in their area, report critical issues up the chain of command, render safe any hazards where they can do so safely and coordinate with other resources where the hazard is beyond their capability to safely address.

Although an early concern for a bus collision incident may be lack of resources, this problem often quickly shifts to one of communication and coordination with incident management partners. EMS personnel must be able to work effectively with fire, rescue, law enforcement and other agencies or organisations. Coordinating with different emergency and non-emergency agencies means recognising that each often has competing priorities.

Non-EMS priorities include law enforcement's traffic control and accident investigation, fire/rescue personnel's extrication and hazardous materials management, the bus company's control of the vehicle and passengers, the sponsor of the bus trip and/or the school if a school bus is involved.

Additionally, EMS providers must be prepared to deal with a larger than normal interest from the media, concerned family and other members of the public who may seek access to areas of the scene that are hazardous or involved in emergency operations.

The bottom line: Don't pick the first available assignment or jump from one to the next. Defining your patients, problems and partners will clarify and prioritise your incident actions and help you accomplish them.

### Phases of management

Although management of bus collisions can be daunting, the problems they present can be addressed by completing the right jobs in order: Think ahead, on-scene arrival, patient access, triage, treatment and transport.

The first three of these jobs, preparing ahead of the incident, arriving on scene and gaining access to patients, all focus on incident coordination. Patient triage, treatment and transport focus on prioritised care and forward movement of patients. Some of these tasks and positions may be outlined by state, regional or local authorities. To meet statutory requirements and to best coordinate with your partners, follow local procedures and recommendations.

Although the job sheets and checklists for these jobs may list a dizzying number of details to be addressed, each job may be thought of within a simple three-pronged framework:

1. Size up
2. Set up
3. Move forward.



- ▶ cut and a battery charge status indicator, ensuring the operator is aware of runtime in real time.

The Lukas E3 line builds on the game-changing 2019 launch of the Lukas Jaws of Life eDraulic Watertight Extrication Tool (EWXT)

line, battery-powered tools that have a longer battery life and stronger cutting force, plus are completely operational when submerged in fresh water. E3 offers all the features and benefits of EWXT and then some. In addition to E3's smart dashboard, E3's new turbo function

**Thinking ahead**

Good coordination begins way before the incident occurs. Remember, the size up, set up and move forward format can help you coordinate your resources for operational success before a bus collision occurs.

**Size up:** Begin by building a list of agencies that may be concerned with a bus collision incident along with their primary contact information. Think beyond emergency service partners like fire, rescue, law enforcement and other EMS agencies.

Consider the operators of busses that travel through your response area. If not the bus companies themselves, who contracts or sponsors the busses? They may be schools, churches, senior centres, tour groups or other organisations. Consider potential patient destination locations including hospitals. Consider sources of alternative methods to transport large numbers of injured and uninjured victims from the scene.

**Set up:** Once you've established a list of stakeholders, reach out to their designated contacts and establish what their expectations and priorities will be when a bus collision occurs.

Your system may not be ready to meet every expectation of every stakeholder, so consider meeting to establishing

short-term goals that may be achieved with current resources as well as long-term goals that will improve the system in the future.

Where possible, establish written agreements and procedures among stakeholders to solidify the priorities and expectations you've agreed upon. These agreements aren't yet the plan but they outline what everyone is trying to accomplish and what everyone is willing to offer.

**Move forward:** At some point, it will be necessary to bring together as many representatives as possible to develop a bus collision plan to deploy resources to manage the incident and attempt to meet stakeholders' priority needs. The plan shouldn't be thought of as a rigid outline for operations at every bus collision incident. Rather, it should serve as a flexible framework to be further honed by later table-top and full-scale exercises.

**Arriving on scene**

When a bus collision occurs, depending on how it's reported, responders may be dispatched for a large-scale incident or a routine MVC. Because of this, all responders, regardless of rank, must be prepared to arrive first on scene and begin to manage the incident.

**Size up:** Although not every responder may give a formal

size-up report over the radio, each and every responder should do a personal size-up on arrival. This will increase both personal safety and overall operational effectiveness. A variety of frameworks exist to facilitate size-up but one of the most simple and effective is UCAN ie unit, conditions, actions and needs. Upon arrival or at any change in assignment or location, ask the following questions:  
 Unit: What's my specific assignment and objective? Whether you set one or get one, your assignment objective should be crystal clear to you and to your partners.  
 Conditions: What are the critical aspects of the conditions in which I'll be working? What and where are the patients, hazards, resources and what's the progress of the incident?  
 Actions: What's the very next thing I'll be doing? Again, this must be clear in your own mind and clear to your partners.  
 Needs: What else will I need to accomplish my assignment, given these conditions? Call for and coordinate with your resources.

**Set up:** On arrival, it will be important for you to establish or integrate with command, control and communications. If no one else has already done so, the first step is to establish incident command to build a framework for responders to work together to resolve the incident. If the incident command system is already established, coordinate with command on arrival as appropriate.

You may not know the incident action plan but you do know that it will involve the management of patients, problems and partners. Clear designation of the patients and who will care for them, problems and who will resolve them or partners and who will work with them are crucial in moving the incident forward and getting it under control.

Effective communication means more than just good radios. Channels and methods of communication must be established during preplanning, well before the incident begins and then followed as the incident unfolds.

**Move forward:** From the moment you arrive on scene, your goal is to move the incident forward and this will almost always be achieved by moving the patients forward. If you're the first responder on scene, it's your responsibility to set up the framework to make this happen by delegating the tasks of triage, treatment and transport, in that order, to the next available qualified crews.

**Patient access**

At a bus collision, access means more than just getting to the patients. It also means creating paths to put responders and resources in contact with victims and then moving them forward to definitive care.

**Size up:** Establish your points of entry to access patients and points of exit from vehicles and hazard areas.

**Set up:** Use one of the following three methods to gain access to your patients:  
 Standard access: Through the normal doors of the vehicles; basically, the same way they got on/in. This is always the first choice.  
 Emergency access: Through designated emergency exits such as windows and hatches. These are generally more restrictive than standard access.  
 Extrication: If neither standard nor emergency access is adequate, you'll need to coordinate with rescue crews to perform extrication.

**Move forward:** Consider how best to move the patients forward. Will you need assistance with moving patients from the vehicles and hazard area? Or will it be better to protect in place? Although forward movement of patients is always the goal, this may best be achieved by protecting the patients in place until you can coordinate with alternative transport to move to definitive care and evaluation or area of refuge.

**Patient triage**

Led by an assigned triage officer, triage allows EMS to move patients forward in the most efficient way and to care for them while doing it.



*Complete the right jobs in order: Think ahead, on-scene arrival, patient access, triage, treatment and transport*

**Size up:** With few exceptions, the triage officer's size-up should consider how best to rapidly access the patients to triage them and get them to the patient collection point, treatment area or area of refuge. It can be tempting to spend time evaluating and treating patients individually but this limits your ability to rapidly identify the most critical patients, move them forward to the care they need and resolve the incident overall.

**Set up:** There are many triage and mass casualty management systems to choose from. None have definitively proven superiority over the others so the best choice is usually the system with which your providers and partners are most familiar.

**Patient treatment**

Treating victims involved in bus collision incidents typically facilitates the continued forward movement of the patients. Although MCI treatment and transport systems vary, incoming ambulances may separate crews so that the drivers remain with transporting ambulances while other crewmembers bring relevant gear and supplies to the treatment area and begin patient care.

**Size up:** The EMS provider in charge of patient treatment, typically designated as the treatment officer, must rapidly

evaluate resources ie structures, staff and supplies. The first consideration is to ensure available structures that protect patients and allow for the provision of care as well as storage of equipment and supplies. Evaluate the number and skill level of staff that will be providing care. Take stock of the equipment and supplies on hand or that provider will be bringing with them.

**Set up:** If set up is completed quickly, as triage is just getting started, the treatment officer should assign some of the staff to help move patients from the triage area, casualty collection point or area of refuge, to the treatment area. As triage wraps up, the triage officer can assign additional staff to assist in the treatment area.

The treatment officer must set up the treatment area to allow for both prioritised patient care as well as the forward movement of patients ie keep in, keep out, clear route. Consider what you want to keep in eg staff, supplies, patients, keep out eg freelancing providers, bystanders, physical hazards and a clear route allowing the effective movement of patients from triage, into treatment and out to transport.

**Move forward:** The first patients in the treatment area will often be the least injured and they may



*The size up, set up and move forward format can help you coordinate your resources for operational success before a bus collision occurs*

# Ambulance technology

By Oliver Wright, chief executive officer, South African Private Ambulance and Emergency Services Association (SAPAESA)



Oliver Wright, CEO of SAPAESA

Technology and its development continue to shape and revolutionize

our daily lives and these same developments are evident within the emergency medical services sector world-wide.

In terms of international development within the emergency medical services sector, how does South Africa compare? Are we leading the pack or lagging behind?

Sadly, it appears that even though South African paramedical staff members continue to remain some of the most capable and experienced in the world, the sector in general is not taking full advantage of a wealth of international research that is readily available for implementation within South Africa. The question must be asked, why?

While it should be noted that the emergency medical services sector in South Africa is chronically underfunded, both by Government and by medical schemes, there are certain changes that can be made and that should be made, with minimal cost implications. With this in mind, we will explore the following topics in more detail:

1. Ambulance cabinet layout design and equipment placement
2. Ambulance seating layout
3. LDV/bakkie ambulance conversions

When it comes to the design of the cabinets in your ambulance, safety and functionality should be top of the list. While the matter of safety and functionality on its own would



easily justify numerous paragraphs of discussion, some of the key factors that should be considered include the type of material used, the positioning of equipment at appropriate locations within the cabinet layout, the securing of this same equipment to cabinet surfaces and within enclosed cabinets.

When it comes to the type of material that should be used in the construction of your ambulance cabinets, it is essential that the material should be both strong and durable. If ambulance cabinets are not constructed of a high strength material, you run the risk of equipment breaking free from their restraints in the event of harsh driving or an accident. A flying defibrillator or suction unit would most likely cause a significant injury at best if not properly restrained. Similarly, if

the cabinets within your ambulance are not manufactured from a strong material, they are likely to separate from their mounting points within the rear of the ambulance should the vehicle be involved in a collision. Cabinets that are not sufficiently strong will injure ambulance crew members and patients and should never be an option.

Oxygen cylinders are arguably one of the greatest risks to safety in the rear on any emergency vehicle. A self-propelled missile in unfortunate circumstances, oxygen cylinders are potentially deadly in the event of an emergency vehicle collision. Oxygen cylinders should always be restrained in the most secure manner in an emergency vehicle. Properly constructed oxygen cylinder brackets are critical to crew and patient safety and are non-negotiable.

Equipment placement is also key to operator safety. Medical equipment should always be laid out in a manner that allows for easy and direct access by the EMS practitioner concerned and in a manner that does not impede access to the patient.

It is imperative that the practitioner treating the patient should be able to reach any piece of key medical equipment while seated and while the ambulance is in motion, without having to move from a safe seating position or with minimal movement in order to ensure that the practitioner remains seated and restrained.

The location of seating for practitioners as well as escorts in the patient compartment of the ambulance is of fundamental importance. The continued prevalence of side-facing seating

be able to assist in moving more seriously injured patients as well as children, the elderly or the mobility challenged.

### Patient transport

The transport officer, perhaps the most challenging assignment, plays a key role in the forward movement of patients and often requires at least one assistant.

**Size up:** The transport officer needs to size up the patients, ambulances and available destinations. These are the first three pieces of information that the transport officer will need at a bus collision incident. The number and severity of patients determines the ambulances or other vehicles that may be needed and the destinations where they'll be transported.

This information will inform the transport officer's size-up of the best location to connect patients in the treatment area with the transporting ambulances or other vehicles.

**Set up:** As the patient loading area is set up at the juncture of the treatment area and the ambulance route, the transport officer will need to establish a method to rapidly track, at a minimum, the patient's priority, the ambulance in which the patient was transported and the patient's destination.

The transport officer and assistants must also establish communications with incident command, as well as destination hospitals and transporting resources. In order to facilitate the forward movement of patients, the transport officer should consider the best routes of transport from the scene to destinations. This is important not only because mutual aid resources may not be familiar with the best routes but also because normal routes may be affected by traffic disruptions.

**Move forward:** The transport officer and assistants focus on moving patients forward by helping to load patients into vehicles according to

priority, while also tracking patients, providing destinations and clear routes to the transporting vehicles, providing incident command with reports and communicating with destinations to ensure that they are prepared to receive.

### Conclusion

Bus collision incidents can be overwhelming but by quickly identifying your patients (number and severity), problems (hazards) and partners (resources), you can quickly begin to bring things under control.

Stack the cards in your favour by coordinating with your resources and stakeholders ahead of time, taking command or an assignment on arrival and gaining access that allows responders to get in and patients to get out of the MCI area. Use effective triage, treatment and transport practices that allow for treatment of a continuous flow of patients who can be effectively moved forward to definitive care. 🔥



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Oxygen cylinders are arguably one of the greatest risks to safety in the rear of an emergency vehicle



Seats with a rotating base allows a practitioner to turn to face the patient to provide urgent treatment



▶ within the patient compartment of the majority of ambulances on South African roads is a potential death sentence to anybody occupying this seating position in the rear of an ambulance.

The most commonly seen, life threatening injuries as a result of a side on collision include injuries to the chest and abdomen, head and face, pelvis and lower extremities, as well as the neck and spine. More specifically, the most frequently injured organs include the brain, thoracic aorta and heart.

We must ensure that we do better to protect anybody travelling in the patient compartment of an ambulance by ensuring that seating in either a front or rear facing position is offered. Given the need for the treating practitioner to be seated adequately close to the patient in the ambulance and to be seated in a manner allowing for practical treatment of the patient, how do we eliminate the risk associated with side facing seating in ambulances?

The answer is simply and easily implementable. Seats with a rotating base will allow a practitioner to turn to face the patient in order to provide treatment that may be urgent or may require more specific patient contact. When the patient interaction is complete, the practitioner can rotate

the seat to return to a forward or rear facing, restrained position, while still remaining within arm's length of the patient in order to be able to provide ongoing monitoring and less intensive treatment.

The use of light delivery vehicles (LDVs), commonly known as 'bakkies' as ambulances within the South African environment, remains a bone of contention within the emergency medical services sector. Some of the more notable concerns relating to the use of converted LDVs as ambulances include the following:

a) The converted patient compartments of these LDV ambulances are never subjected to mandatory crash testing and, as a result, there are no minimum South African National Standards (SANS) that apply to the design and manufacturing of the patient compartment of these ambulances.

The unacceptable design standards that continue to be followed by certain ambulance manufacturers in South Africa with regards to LDV ambulance conversions was recently witnessed in KwaZulu-Natal when a Department of Health LDV ambulance essentially disintegrated on impact during a collision. Photographs from the scene show that absolutely no attention had been paid to passenger or practitioner

safety when this specific ambulance was recently manufactured and the patient compartment appears to have been manufactured from nothing more than chromadek filled with polystyrene with no sort of consideration to any sort of impact or roll over protection.

It is reassuring to see that some of the more progressive ambulance manufacturers in South Africa are now manufacturing LDV ambulance conversions by making use of an all steel construction process, however, the lack of SANS guidance and mandatory crash testing for ambulances that are based on light delivery vehicles (LDVs) remains and ongoing concern that presents an immediate danger to any patients, EMS practitioners as well as patient escorts who may be travelling in any of the poorly designed and manufactured LDV ambulances that continue to be operated across South Africa.

b) The height of the LDV ambulance conversion, weight distribution of the load as well as the basic suspension geometries of base LDVs upon which these bakkie ambulances are based, only adds to the safety concerns around the use of these vehicles as ambulances. The suspension setup on any LDV is typically focused on carrying as much weight as possible but is this does not always translate to a suspension setup that is also

# German Embassy sponsors COVID-19 ambulance and equipment for Namibian medical NGO

The German Embassy supported Windhoek-based EMA Emergency Medical Assistance Organisation in its quest to provide excellent medical assistance during the current pandemic and beyond. The German Ambassador in Namibia, HE Herbert Beck, handed over a special ambulance and medical equipment to local NGO EMA in the presence Hon Deputy Minister, Jeremiah Nghipundjwa, acting deputy executive director, officially delegated to represent the Ministry of Health and Social Services, as well as acting deputy executive director Petronella Masabane.

A total of 1 888 610 NAD or 97 351 Euros from the 2020 micro project fund of the German Embassy was made available for the purchase of a special ambulance and medical equipment to mitigate the high impact of COVID-19 on Windhoek residents. The main focus is to assist vulnerable community members by providing free access to emergency

medical treatment and transport to hospital. This service is primarily for people who are without medical aid and unable to afford emergency medical services.

EMA provides a rapid-response emergency medical service comprising of immediate medical care by trained professionals and onward transfer to a recognised medical facility and services all Windhoek locations, including the informal settlements.

With the specially equipped ICU negative pressure ambulance for COVID-19 cases, EMA will complement the already existing emergency service of the MoHSS and CoW by providing rapid-response medical service. Given the current COVID-19 situation, this special ambulance will increase the chances of survival for the patient during transport.

The ambulance's rear interior includes a medical and three bench seats with safety belts, negative pressure filter



system, UV light cleaning system, cabinet system, inverter system, intercom to the front, Ferno type roll-in stretcher, air conditioning, weather station and timer, LED dim light system and a spot light. Equipment include a removable high infectious disease chamber, defib monitor with 12 lead ECG, EtCO2, SpO2, NIPB, temperature, respiratory rate, vacuum mattress, scoop stretcher, video laryngoscope, KED, blue splints, head blocks, pelvic grip set, Ferno type soft neck collar, burn pack, mobile suction unit, ILS/ALS emergency bag, isolation suits etc. ▲

safe for high speed driving in an emergency situation.

These LDV vehicles are often unstable at speed, both because of basic suspension designs and because of the high centre of gravity that becomes evident once the patient compartment is added to an LDV to create the ambulance vehicle. The high centre of gravity not only serves to make these LDV ambulances unstable during cornering and emergency manoeuvres but also during instances of strong winds, which is a daily occurrence in a number of South African provinces.

While it is often argued that the use of LDV ambulances is essential to the servicing of rural communities and while it is argued that accessing these rural communities means that an LDV ambulance will often be operated at low speeds while navigating rural road networks, the LDV ambulance will also be required to travel at higher speeds on regional and national roads once a patient has been located and is subsequently transported to hospitals in nearby towns and cities. These same hospitals can often be located hundreds of kilometres from the patient's home, which will require extended

transportation in these same LDV ambulances under unstable driving conditions, which adds to poor patient and practitioner safety as an additional concern.

Simply put, there must be a better solution to the use of LDV ambulances in South Africa and an urgent and immediate change of thought and approach to the matter is now required.

This is the first in a series of articles looking at ambulance design and technology and the importance of safe guarding the lives of our medics and patients. ▲

# Botswana Ministry of Health invests in 120 new ambulances



control (PDC) and reverse cameras as aids for the medics.

There were 74 standard ambulances for the Ministry of Health with one specification and 46 for Ministry of Health EMS Emergency Response division with a different specification.

All vehicles were delivered fully equipped with medical equipment as per the Botswana Ministry of Health specifications.

All vehicles had reflective branding either in Ministry of Health layout or EMS layout.

The floors and edges of floors with furniture and walls were covered in red polyurethane rubber coating for a safe and watertight ambulance.

The furniture was custom built to their specification in mild steel, sand blasted and then electro powder-coated in white to be able to be cleaned easily. All the furniture and brackets were produced to fit their equipment and with crew and patient safety in mind.

“We fitted Sitmed MWS 320 stretchers that are hard wearing and can take a large weight, with large wheels. These stretchers were redesigned for Southern Africa by the Brazilian manufactures with Oliver Wright of the South African Private Ambulance and Emergency Services Association (SAPAESA) and EVC’s input, as they are usually used in much bigger vehicles than we use in Southern Africa”, said Rosenthal.

All vehicles had the latest emergency warning lights, sirens and interior light designs with LED technology. The new ambulances were fitted with rear air-conditioners for the patient sections and supplied with factory-fitted in dash units. Full bulkheads with windows for communication to separate the drivers and patients compartments were fitted, which

The Ministry of Health Botswana invested in 120 new ambulances earlier this year. The ambulances were built by South African company, Emergency Vehicle Conversions (EVC) based in Jet Park, Ekurhuleni that specialises in basic, intermediate and advanced life support ambulances designed to suit your specific environment.

“We completed 120 Toyota Quantum ambulances for Halfway Ngami Toyota

in Maun, Botswana, for the Botswana Ministry of Health between March and the second week of July 2021. These had to be out in this time due to the budget period of the Botswana Ministry of Health”, said Jonty Rosenthal, managing member of Emergency Vehicle Conversions (EVC).

The vehicles that were used for the conversion are Toyota Quantum super long wheel base (SLWB) panel vans each fitted with park distance



# EMERGENCY VEHICLE CONVERSIONS

Ambulances Mobile Clinics Specialised Emergency Vehicles Specialised Utility Vehicles

Manufactured to your own specifications and tailored to meet your needs





is becoming a norm due to communicable diseases etc.

The new ambulances have secondary batteries to which the auxiliary electrical systems are connected. These run through an intelligent system that protects the vehicle's battery and will make sure the vehicle does not have starting issues, the system will check the health of batteries and start charging the second battery after one minute of the vehicle running.

"We also had the inverters converted to only operate when the vehicle is running so the secondary battery is not drained while the vehicle is not being used. We have been fitting USB charging sockets for many years and these vehicles also had them installed in the patient compartment", added Rosenthal.

The interior lights in the vehicle can be independently switched and dimmed as needed.

The vehicles have brackets to assist with holding equipment in such a way as to be user friendly and in reach of the treating paramedics.

Rosenthal said, "We are constantly moving towards better integration of systems and newer materials. We currently use a PVC foam board for walling, flooring and bulkheads which is recyclable, fire retardant, insect retardant and chemical resistant."

"Newer technology in vehicles that are now being offered is also helping us integrate systems for crew, patient safety and can be used as driver aids, which is evident in our new project with VW South Africa for North West Province whereby they are offering EMS derivatives of the VW Crafter for ambulances. We also work with their technical department to make sure we integrate our technology and builds as best as possible with their systems. These vehicles are equipped from the factory or upscaled by EVC with the following equipment: rear view camera, wind stability control, park distance control and dual batteries, amongst others", Rosenthal concluded. ▲

## New technology for ER24's new generation ambulances



ER24's new specialised ambulance fleet is taking emergency medical care to the next level. The new-generation high-roof Toyota Quantums will eventually replace all current vehicles but the project will take a few financial years to complete, said Rhett Davis, ER24's procurement and fleet manager. At the moment, each region has at least one to two new ambulances and our patients and healthcare practitioners are reaping the rewards.

### Interior redesign

After nine months of preparation, ER24's first batch of new ambulances rolled out in August 2020. "We had to first do a full redesign of the interior because of the size of the vehicles compared to the old ambulances. They're much bigger than what we had before," said Davis.

"The project has called for teamwork between Peter van der Spuy, ER24: general manager Quality Assurance and Support Services, our fleet and our operational staff, who are best placed to understand the needs of their patients and were central to the redesign process", Davis added.

Van der Spuy enlisted operational staff to get their take on where the downfalls were in the previous conversion and what they wanted to have in the new conversion. "This was aimed at ensuring a more efficient and effective patient journey," Davis explained. "Simultaneously, we

needed to supply our staff with the necessary safety measures as well as securing medical devices and equipment in the ambulance."

Having overhauled the vehicle layout with the help of industry experts, the team also brought an ultra-modern design to the ambulance interiors. Aside from meeting international standards, experts ensured that the vehicles adhered to local legislative requirements.

### What's new?

From a built-in navigation system with live tracking, to crew panic alarms, to additional emergency warning lights, the new ambulances boast a wealth of new features. "New, bigger ambulances allow the patient a more comfortable ride. The healthcare practitioners have the benefit of a much bigger work area and a much safer working environment," said Davis. "They don't have that cramped workspace any longer." The added space is also a welcome improvement in light of the added difficulty posed by COVID-19 PPE requirements.

"We've also fitted a full inverter system in the new vehicles to power medical equipment and there are now cutoff switches for the inverters too."

Safety was a priority in kitting out the new vehicles. "In terms of the emergency warning systems, we've really made our ambulances world-

*"Safety was a priority in kitting out the new vehicles"*

class," Davis continued. "With each batch we're buying, we're making further improvements to ensure our vehicles and crews are safe when responding, as well as on a scene."

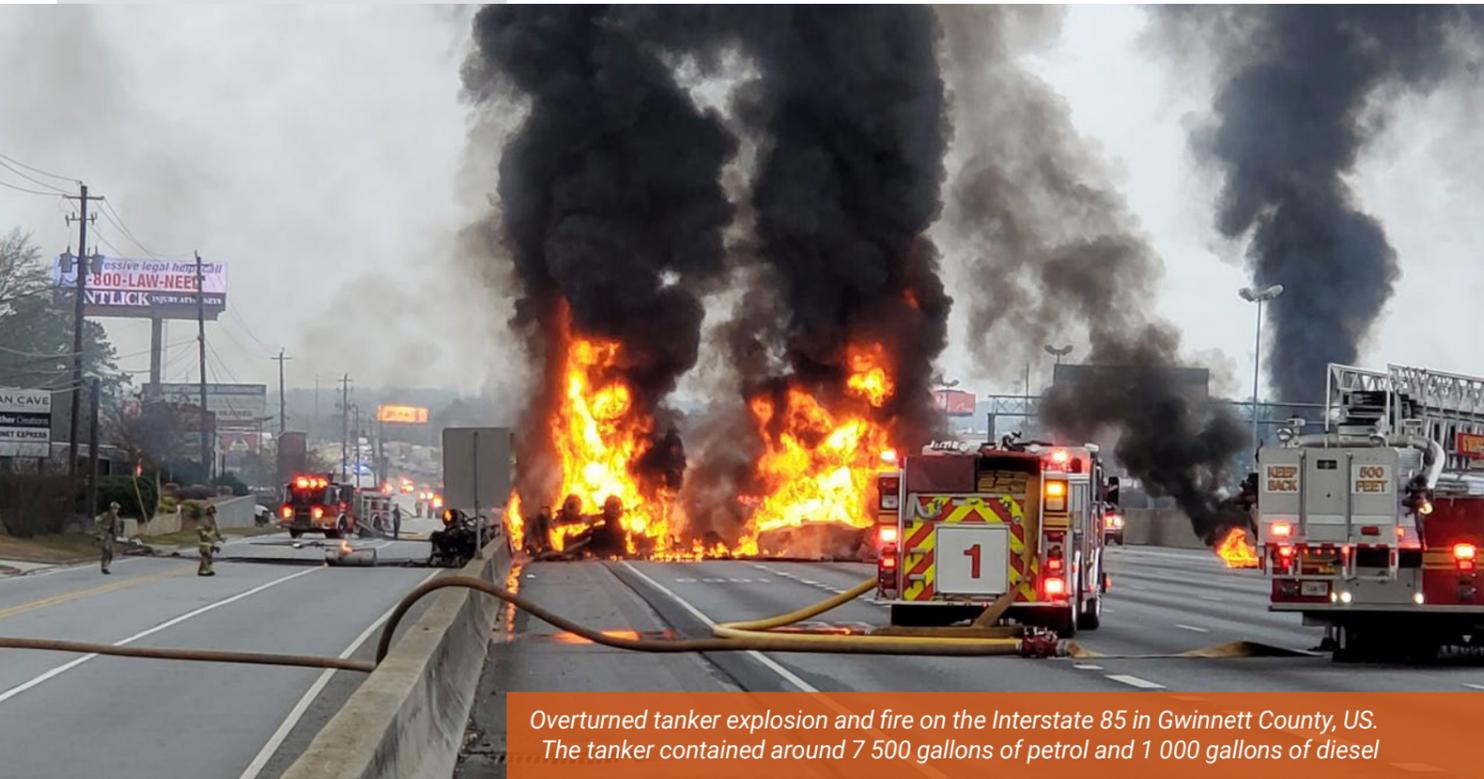
ER24 has also become the first emergency service in South Africa to use the rumbler siren system, which has a low-frequency tone that causes vibration in the road network. "People not only see you coming but they feel you coming regardless of how loud their sound systems are," explained Davis. This will hopefully mitigate some risk of intersection accidents. New ambulances are all fitted with standard 200-watt siren systems as well as the rumbler system.

The vehicles are also higher and feature high-visibility lighting. "Following international standards, we've moved away from a steel-type conversion to a very lightweight and aerodynamic conversion within the vehicle," Davis added.

"Ultimately, the new ambulances are just another way for ER24 to keep providing innovative, world-class emergency care." ▲

# Flammable liquid fuel road tanker emergencies

By Colin Deiner, chief director, disaster management and fire brigade services, Western Cape Government



Overtaken tanker explosion and fire on the Interstate 85 in Gwinnett County, US. The tanker contained around 7 500 gallons of petrol and 1 000 gallons of diesel

Tankers transporting various types of liquid fuels are a common sight on our roads. The many diverse locations of fuel stations across the country results in these vehicles traversing a wide variety of roads in order to service them. Fortunately, fuel tanker emergencies are rare; however, they can be diverse and can range from a leaking, overfilled vehicle with no fire to a collision or rollover with or without product ignition.

Tanker truck emergencies are classified as 'low frequency/high risk' incidents and will almost always make for rather spectacular viewing.

## Legislation

The transport of dangerous goods in South Africa is regulated by the

National Road Traffic Act (Act 93 of 1996 as amended). This Act requires compliance to a National Standard, namely SANS 1518:2011 Edition 4 - "Transport of dangerous goods - Design, construction, testing, approval and maintenance of road vehicles and portable tanks". SANS 1518 in turn requires compliance to specific sections in the "European Agreement concerning the International Carriage of Dangerous Goods by Road", commonly referred to as the ADR.

A range of other standards also become relevant to this industry depending on the specific operation of the business. These include standards on design, construction, testing, approval and maintenance of road vehicles and portable tank, the identification

and classification of dangerous substances and goods, packaging of dangerous goods for road and rail transportation and emergency information systems.

## Tanker truck construction

The typical tanker truck configuration consists of the chassis/cab component and the product compartment which is constructed of aluminium and has a ladder providing access to the top of the tanker. The product compartment can be divided up into several sub-compartments that makes it capable of transporting different types of product.

Each product compartment (tank) has a fixed ladder providing access to the top where a series of dome hatches are located. (These are the

locking lids for the opening at the top of each compartment).

Filling and emptying of the tank are enabled by the belly valves which are located at the bottom of each compartment. There is also an emergency shut-off valve that will close all belly valves in the case of an emergency.

From the belly valve, the belly pipe (wet line) extends to the compartment external valve where a flexible hose is attached for off-loading and most times on-loading product. Activation of the emergency shut-off will therefore stop the flow of product into the wet lines. Each belly valve can be individually controlled by a valve control system located remotely. Unless the tanker is empty the belly pipes will generally have product inside them. This is important to remember when responding to a vehicle under-ride incident where these pipes might have sheared off or suffered some other sort of damage.

The shut-off valve is further augmented by an additional system designed to shut off all belly valves in the event of a fire under the product compartment.

Further safety systems on the vehicle include the following:

- A 'pull-away socket and plug system' (Scully device) that is plugged into the loading terminal to control the fill and prevent overfilling while also dispersing static electricity.
- Pressure relief valves designed to keep the pressure within the tank's design limits. The tanker will be fitted with both a positive-pressure relief and a negative pressure relief. Although a liquid fuel tanker is a non-pressurised vessel, pressures of more than four psi (approximately 0,27 Bar) will activate the positive-pressure relief to prevent any build-up of pressure. Similarly, any negative pressure will activate the negative pressure relief valve and allow air to enter thereby eliminating any chance of buckling of the aluminium tank walls.
- The rollover rail, which is mounted along the top side of



Understanding the physical properties of the fuel involved will give a good indication of how they will behave in spill and fire conditions

the tanker and is designed to protect the components located on the top of the tanker in the event of a rollover.

- The vapour valve, which allows vapour to enter each individual compartment to replace the liquid product that has been offloaded. The tanks are also fitted with vapour recovery systems which are a series of pipes and connections that are used to recover flammable vapours.

Each sub-compartment is fitted with a solid separation wall called a bulkhead and within those compartments several walls with holes in them are installed. These 'baffles' are designed to reduce the surge movement of the product when the vehicle is moving.

In multi-load tankers designed to carry more than one type of fuel, you will find that the compartments are fitted with double bulkheads that are meant to prevent any cross contamination of products should a single bulkhead suffer damage. Ventilation holes are fitted between the two bulkheads and are visible at the bottom of the tank.

A distinctive feature of a liquid fuel tanker truck is the elliptical shape of the tank compartment. When viewed from the back of the truck a series of two black dots will be visible (in the three and six o'clock positions). These are where the baffle holes are located that allows liquid to flow to

both sides of the baffle when the tanker is lying on its side.

The final feature I would like to mention would be the 'Dangerous Goods' placards that shall by law be affixed to each cargo containment area of a rigid vehicle, semi-trailer and trailer, one at the rear and one on either side of the vehicle, so as to be clearly visible from the roadside. This will be dealt with in greater detail later on. The tankers the specification plate is generally mounted on the side. The specification plate will provide information on the material from which the tank is manufactured (AL=aluminium).

In accordance with South African law, vehicles involved in the transportation of hazardous goods such as chemicals or high-pressure flammable material must carry the following documents:

- Transport emergency card for each Dangerous Goods item
- One or more Dangerous Goods Declarations to cover all the goods that comprise the load
- Confirmation of Classified Waste, if applicable
- Container packing certificate, if applicable
- A nominally empty packing certificate (see SANS 10406) if applicable

It is very important for first responders to have a clear understanding of the construction

► of a liquid tanker truck and how its various components and safety systems work in order to effectively deal with an incident involving one. The impact of a potentially major incident can be massively diminished by the utilisation of the vehicle safety systems as part of the fire fighting or rescue operation.

**Emergency response**

If we think about all the places that fuel stations can be found, we can appreciate that fuel tanker fires could be caused by several factors and occur in many diverse locations. To a large extent, the location will be the most crucial factor in determining the strategy and tactics to be employed in dealing with a fire of this nature. Fuel tanker emergencies are, of course, not limited to fires but could also include tankers not on fire but leaking or that have been overfilled, overflowing of storage tanks, overturned tankers or tankers involved in motor vehicle accidents with or without fires.

Fuel tanker truck emergencies generally create quite a spectacular scene but, depending on its location, should not create any extraordinary risk to the fire fighting teams if handled systematically with clear direction. A good working

knowledge of the construction and safety features of the vehicle will contribute greatly to a calm and measured fire fighting operation and early control of the incident. The amount of smoke and flame generated by a tanker fire will draw significant attention, which could add the additional burden of larger groups of onlookers and media. Onlooker control will have to be an early command consideration in such an emergency.

While the location of the incident will play a big part in the strategies to be employed, the second most important factor would be if the spill is contained or not. Consider the following few scenarios and the varying levels of difficulty attached to them:

1. Tanker on fire on a bridge with a flaming fuel spill into a water stream flowing below it carrying burning fuel downstream to an area with dwellings located on either side.
2. Tanker accident without ignition on an overpass in a busy city during rush hour with hundreds of sources of ignition (other vehicles and people) in proximity.
3. Tanker on fire on a freeway with the fire contained within the aluminium tanks and no large spillage.

While the first two incidents will severely test your department's response capacity and command decision making and may even exceed your resource capacity, the second incident could be quite easily handled by your first in units, provided you have a well-planned standard operating procedure (SOP) for these types of incidents.

The risk to human lives will always be the first consideration for the incident commander. This will include any victims of the incident, responder, and the public in the immediate vicinity. While evaluating the location and magnitude of the incident, the incident commander should also consider the potential environmental damage, any possible exposures and the disruption to the transportation system around where the incident has taken place.

Understanding the physical properties of the fuel involved will give a good indication of how they will behave in spill and fire conditions. Due to the specific gravity of petroleum products, they will be able to flow on top of water and could be carried for quite a distance before finding an ignition source. Should it flow into storm water drains, uncovered

manholes or any other confined spaces, the vapour density of the product could cause a build up of flammable gasses, which could then lead to a confined vapour cloud explosion and any resulting, secondary ignitions. Ignited product floating on top of a rapidly moving stream will be a major challenge as it presents a moving target for resources generally focused on static operations. Knowing where the spilled fuel is flowing to, will also be critical in determining the most effective response. Consider the infrastructure around the incident. If the fuel is running towards a recessed parking garage or a storm water system, this will guide your placement of fire fighting resources and evacuation procedures.

The type of fuel involved will also determine the choice of foam application. Fuels such as ethanol are polar solvents that will require the application of alcohol-resistant aqueous film-forming foam (AFFF) or fluoroprotein, film-forming fluoroprotein (FFFP) foam.

As with any hazmat call, the first action in your SOP should be to approach the incident from upwind and uphill or upstream. Staging a safe distance away will allow you to determine the type of tanker involved, the product involved and what it is doing (spillage without ignition, fire or any other mechanical damage ie a road accident).

The situation may be of such a nature that responders can't learn all they need to know about the vehicle from their vantage point. This may be for a variety of reasons such as the tanker is on fire or partially obscured by a ditch or another vehicle.

The Dangerous Goods placard, as legally required, will indicate the four-digit UN number of the dangerous goods being transported and when waste is transported, the word "WASTE" will be added above the UN number. In the case of a mixed load, the words "MIXED LOAD" will appear in the goods identification zone, with the two words "MIXED" and "LOAD" one above the other. The operator's



*Petrol tanker caught fire on N3 highway in Ekurhuleni, South Africa*

telephone number as well as a number for specialist advice will also be on the placard.

Finally, it will also display the hazard class diamond appropriate to the hazard associated with the goods in terms of SANS 10228 and where subsidiary risks are identified in terms of SANS 10228, the subsidiary risk diamonds will be attached to the sides of the hazard class warning diamond.

Attempting to locate the driver/operator will also be invaluable. This might not always be possible if he/she has been injured or departed the scene. It is from the driver/operator that you will be able to get additional information such as the mechanism of the accident and the volume of product on board. Should the driver not be available, the emergency number could even be helpful in providing the information needed. Modern operators have a remote tracking ability that registers each time product is off-loaded and should be able to easily provide this to the responders.

One of the most common incidents involving road tankers that fire departments will respond to, will be when a fire starts under a tanker. This may be caused by a vapour release from an underground tank during a filling operation, an overflow of an underground tank, a smaller vehicle underride leading to ignition or a brake or tyre fire. A large measure of control can

be achieved on such incidents by activating the emergency valves thereby isolating the tanks; the fire can then be attacked with foam lines or Class B fire extinguishers. An aluminium tank will not be breached below the level of the product in it although the aluminium above the liquid (the vapour space) may burn through and allow the vapour on top of the product to burn. This is still ultimately a manageable operation that does not require huge resources. A well contained foam attack while protecting any exposures will allow quick control and extinguishment.

Should the fire breach an aluminium wall of an empty tank, the vapours still inside the tank will be likely to flash and cause secondary ignition.

In the event of a tanker truck being involved in a rollover without a major spillage or fire, it will be necessary to transfer the product to another tanker before it can be uprighted. This is mainly due to the mass of the product and comparative weakness of the aluminium tank. This is a highly complex task that involves drill into the aluminium tank and transferring the product into an empty tanker and is usually carried out by private contractors or specialised hazmat team. It would, however, be required of the fire department to provide support in terms of isolating the scene and firefighting capability. Good



*Oil tanker explodes after crashing into pylon in Chiang Mai, Thailand*

# Multi-generational leadership in the fire service

By Etienne du Toit: AIFireE, PrDM, B Tech: Fire Technology (Pretoria Technicon)

**"Each generation imagines itself to be more intelligent than the one that went before it, and wiser than the one that comes after it."**

**George Orwell**

**"E**ach generation imagines itself to be more intelligent than the one that went before it, and wiser than the one that comes after it." ~ George Orwell.

In Fire and Rescue International Volume 6 number 1, I wrote about the "importance of developing leadership and standards within the fire and emergency services. Specific reference was made to the "Gordon-Howell report in which four

criteria for defining a profession are suggested". For this article, I am going to focus on the first of four suggestions, namely, "A profession should rest on a systematic body of knowledge of substantial intellectual content and on the development of personal skill in the application of this knowledge to specific cases."

The next generation of fire service leaders are already in the making. Every generation has its own values

and viewpoints. It is those differences that define each generation but often also lead to disillusion among younger team members and has the potential to cause friction among different generations.

Any leader expecting to be successful in the contemporary workplace, will have to be very skilled at building and sustaining a culture that not only appeals to people from multiple generations but that deliberately pursue and stimulates collaboration between them.

When I first joined the fire service in 1986, I thought I had a good understanding of leadership. As many young South African men of that era, I completed my compulsory National Service in the military. I therefore immediately related to the hierarchical leadership within the fire service. As in the military, there were people in command and there were the rank and file like me who performed the work. There were no grey areas; everybody knew exactly what was expected from them. We worked in a system under clear supervision of a leading fire fighter, which was in turn managed by a station officer. There was a clear

and saving the truck by driving it away from the burning trailer?

Think these things through. They are the types of choices you may have to make.

Finally, what does your foam system look like in your department? Are you able to deploy the resources you need to rapidly contain the types on incidents described above and prevent them from getting so large that your bad preparation made you the idiot on the evening news? ⚠

span of control and unity of command. I realise today how much I learned and indeed how little I knew about leadership back then. Leadership may be as simple as just doing the right thing or even just to have the confidence to assume responsibility.

Information at the time was not as readily available as now and mostly limited to printed material. The "Manuals of Firemanship" as well as The Fire Service Drill Book provided the foundation for most training and development.

It is accepted that the structures found in the fire service provide a balance, when performing fire fighting, at various emergency scenes and in other activities of the organisation. These structures with which many of us are familiar certainly have their place. Similar reporting models and chains of command exist throughout all military and paramilitary organisations and in fact, most of the public service, including municipalities where the fire service function reside.

Unintentionally, the structure adopted by most fire services, although crucial on the fireground, has the tendency to potentially hamper the development of young leaders with onerous chain of command obstacles. How many times have we heard "this is how we do things here"? or, "it is a good idea but it will never work here". It may or may not be true but simply dismissing an idea because of the belief that the current way is the only way will inevitably lead to a culture where innovation is discouraged.

The fire service, as all other professions, is made up of multiple generations. Millennials, also known as Generation X or Gen Y, probably make up the bulk of the fire service. This generation may be identified by raised usage of and familiarity with electronic devices and social media. They are far more likely to question certain decisions and generally require detailed explanation thereof. Unlike their preceding generation, they have no prior exposure to the organisational structures into which they enter. A very small percentage, if

any, has had exposure to a military or paramilitary organisation.

How do we as leaders encourage our team members to be creative and innovative within the current organisational structures? The fire service prides itself on a strong culture and tradition of public service, rightly so. We as leaders must preserve the former; however, we also need to create an enabling environment where innovation and creativity become part of our culture and tradition. As previously acknowledged, the organisational structure of the fire service is there for a good reason and has its place in all aspects of its activities. However, affording a team member the platform to share an idea with anyone in the organisation provides the open dialogue necessary to engage the incoming generation and make them feel part of the organisation.

Some of the most successful organisations, corporate as well as military, elicit a free exchange of ideas and encourage people, regardless of rank and experience to openly discuss different ideas across all levels of the organisation. By allowing this exchange, organisations are constantly challenging themselves to be better, to grow and learn and that by communicating across the ranks, there is true value and ownership for all members of the organisation.

A major challenge faced by senior leaders is the dynamic and changing environment in which they operate. The leader can easily become isolated from the exigencies and realities of critical day to day operations. The successful leader engages the organisation in continuous learning and adjusts strategy based on shared knowledge.

We must prepare our potential leaders to engage all knowledge and means including abstract reasoning, to correctly identify and appraise complex, multi-faceted events under potentially punishing, life-threatening circumstances and issue directions to manage accordingly.

*"The most effective leaders I have had the privilege to work with have been inclusive leaders, those who value the contribution of all their team members thereby nurturing a sense of belonging"*

That is the basis of why organisations have policies, standard procedures and guidelines that we follow in what we do, whether it is on the fireground or in our daily station routines, fire service standard test and daily drills serve as example. These structures are crucial and should be followed to remain safe and effective.

In addition to these written policies and procedures, we must also train our young leaders to not only know and understand these but also to know how to apply them to their current environment. There may be occasions when these written procedures do not provide all the answers; thus, the training and career development of your officers is instrumental to doing the right thing so that objectives of the organisation are met. The days of dismissing 'outside of the box' thinking or having an opposing opinion on how objectives may be accomplished, has no place in the modern fire service.

The most effective leaders I have had the privilege to work with have been inclusive leaders, those who value the contribution of all their team members thereby nurturing a sense of belonging. These leaders also had the ability to adapt well to changes within the organisation, their decision making was transparent and receptive to any feedback from the people they lead. More importantly, they recognise generational differences, value those differences while focusing on the organisation's needs. These leaders were flexible enough to leverage the strengths of each generation thereby creating an engaging and rewarding environment. 🔥

► coordination and communication must be ongoing between the contractors/hazmat team and the fire service incident commander.

## In closing

Flammable fuel road tanker emergencies can present a myriad of challenges to emergency responders. As I stressed earlier, the fact that they are mobile means that incidents involving large volumes of flammable liquids can happen almost anywhere. Add to this the fact that responders

could be faced with two probable scenarios: (1) a major incident (incident with ignition) or, (2) a potentially major incident (incident with no ignition). Both scenarios will require you as incident commander to make many decisions, which might not always be part of your playbook. What if you had a tanker on fire right next to a multi-storey residential with smoke pouring into open windows all along its frontage? What if you had a trailer on fire and you had the option of dropping the trailer's landing gear

# New Incident Command System (ICS) Master-Mind PC Game launched



The general definition of training, being it refresher or by playing training games is, 'It is the process of learning the skills that you need for a job or activity by acquiring the knowledge, skills and abilities for effective performance.' Most of us play games and, as you hit the start button on the first question, you see the timer start counting down 10... 9... 8... 7... and then you remembered you chosen the 'hard' option, 20 seconds to answer the question! Time elapse and you could not finish or answer the question correctly?

Then welcome to the all-new Incident Command System (ICS) Master-Mind PC Game where fun is the name and the game, while refreshing and learning ICS terminology, skills, the planning process and much much more!

The ICS Master-Mind Game will allow for you or your organisation to:

- Have trivia days
- Challenge yourself
- Have fun competitions with friends

Whatever you want, the all-new ICS Master Mind Game will bring it to you!

The ICS Master-Mind PC Game consists of the ICS I100 (Basic ICS), ICS I200 (ICS for initial response), ICS I300 (ICS for expanding incidents)

and the Full Planning Process including the demobilisation leg. The component on each level includes multiple-choice and true/false questions, while the Planning Process consists of relevant quizzes for every 'block' of the Planning Process.

You choose your level of skills to play the game and answer more than 200 random questions per level from easy to hard. Some back-ground music set the tone, which can be turned off. The game also includes some 'funky' sounds if you right or wrong and cool, soothing colours for the eyes. The game automatically keeps your highest scores, so you do not need to start over.

We even added a pause button if you need to look up answers or get a quick cup of coffee or want to browse through the help files.

Ask yourself now again the question, 'Should refresher training/skills development not be a standard? Especially when we work or manage people during incidents or events, no matter the size or the complex?'

We all know that knowledge fade over time; it is basically 'use it or lose it' unless we review from time to time. So why not use a fun method to keep you updated?

Eight reasons to use the ICS Master-Mind PC Game:

1. It helps to build long-term memory and knowledge of the ICS
2. It reduces mistakes and improves productivity
3. It brings you back to speed after long break not implementing the training
4. It helps keep everyone on the same page and learning becomes part of the culture and not just a certificate
5. It keeps you up to date with the industry
6. It helps as a reminder important but seldom used information
7. It develops manager and supervisors into leaders
8. It identifies knowledge gaps and training needs

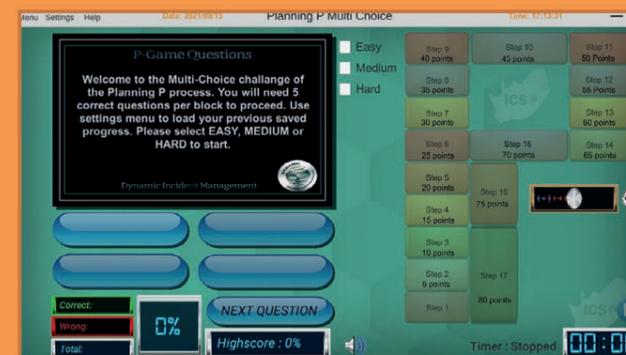
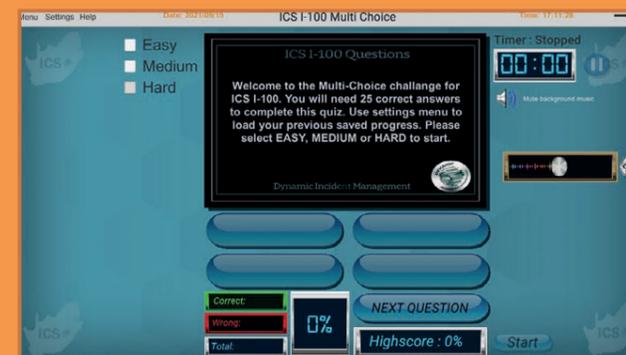
Invest in your people, organisation and yourself by continuing to grow your fundamentals of the Incident Command System (ICS) with our new ICS Master-Mind PC Game.

We are working hard to bring you the next level of different ICS games that will blow your mind and grow even your ICS practical decision-making processes. Available soon!

Contact us for our special on our ICS Master-Mind Game, where your fun begins! ▲

# THE ALL NEW INCIDENT COMMAND SYSTEM (ICS) MASTERMIND GAME

Dynamic Incident Management is proud to provide the FIRST ICS Master Mind Game in South Africa



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# The Lowveld and Escarpment Fire Protection Association

LEFPA has about 500 voluntary members covering roughly 880 500ha within an operational area of 1 980 000ha



LEFPA had its first meeting in November 2000 when it was decided to incorporate the district of Ehlanzeni (landowners, large forestry, agriculture and the community), which form part of the association.

Fire and Rescue International spoke to LEFPA manager André Scheepers about the FPA's history, risk profile resources and alliances.

With approximately 500 voluntary members covering roughly 880 500ha within an operational area of 1 980 000ha, LEFPA is one of the largest FPAs in the country and deals with all aspects of fire detection, prevention, suppression, rehabilitation and awareness. LEFPA is a member of the Mpumalanga Umbrella Fire Protection Association (MUFPA) and its operational area includes state land, forestry, agriculture, plots, small holdings and conservation properties from Bushbuck Ridge to Badplaas and Komatipoort to Machadodorp. LEFPA has reciprocity agreements in place with adjoining FPAs to assist and support with additional resources in the event of need.

Services offered to its members include fire fighting aircraft, fire fighting ground crews, dispatch centre, dispatch and coordination of resources during fires, fire detection, fire awareness, weather forecasting, weather updates, issuing of burning permit, GIS mapping, training related to integrated fire management and fire related legal advice.

LEFPA has four membership categories:

1. Agriculture
2. Conservation
3. Forestry/processing
4. Municipal/residential.

Their base office has been at Canary Walk Centre in Nelspruit for the past 11 years but they will be relocating back to Nelspruit Airfield (FANS) as of January 2022.

Permanent staff includes André Scheepers as manager since 2008, Ivina Alberts as administrator, Angela Norton as finance officer, Queen Khoza as base manager and Nomcebo Mlotywa as permit officer. Ad hoc personnel in season includes a GIS officer, seasonal Working on Fire (WoF) dispatchers and seasonal LEFPA dispatchers.

The board of LEFPA consists of representatives from each category including the general manager and fire protection officer. Members elect a representative/s within their membership category every three years. This representative will sit on the LEFPA. The board elects a chairman, vice-chair, secretary, alternate board members and co-opt additional members (if required) for a three-

The Lowveld and Escarpment Fire Protection Association (LEFPA) was founded in 2000, DAFF registered in 2004 and registered as an NPC in 2014. LEFPA is a non-profit organisation registered in terms of the National Veld and Forest Fire Act, 1998, In this ACT in Chapter 2 (3.1) states that landowners may form an association for the purpose of predicting, preventing, managing and extinguishing wildfires and apply for registration as a Fire Protection Association (FPA).

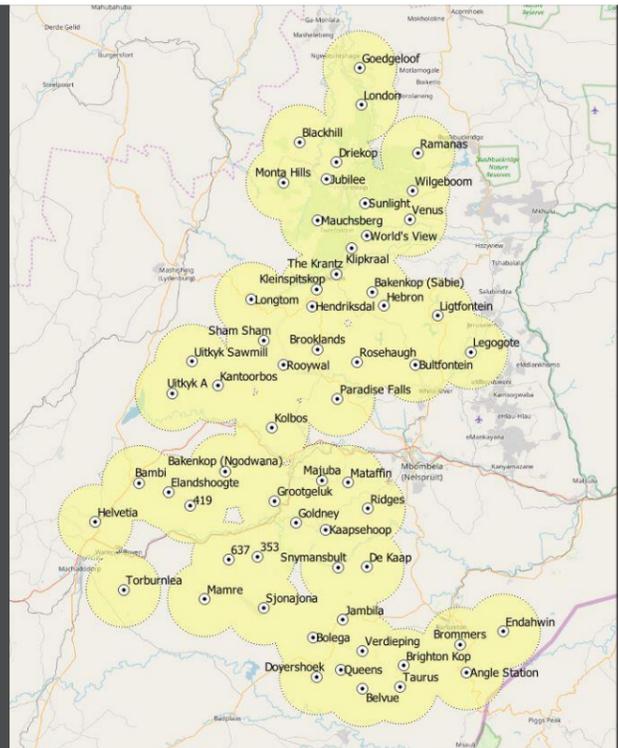


LEFPA dispatcher Nomcebo Mlotywa, WoF dispatcher Pleasure Nkosi and LEFPA administrator Ivina Alberts doing morning reports on FireWeb in the LEFPA ops centre



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LEFPA operational area

fully equipped crew room 'HotSpot', a top-class type 1 dispatch centre based at Canary Walk Centre in Nelspruit dispatches air and ground resources with a type 1 dispatcher and three type 2 dispatchers operating on a shift or FDI basis.

Resources contracted to LEFPA during the fire season include three spotters, three fixed-wing bombers including two Air Tractors 802s, one UH-1 Hueys and the first in the country to operate the UH-60 Black Hawk from Leading Edge Aviation, all based in Nelspruit. LEFPA also operates a Helistop at Tweefontein in Sabie, where two UH-1 Hueys are based.

"As of the 2021 fire season, we have established three temporary landing zones (forward bases) at Nelshoogte, Elandshoogte and Graskop, where choppers could be relocated to during high FDI days. Two additional ad hoc



LEFPA deals with all aspects of fire detection, prevention, suppression, rehabilitation and awareness



Resources during the fire season include three fixed-wing bombers

► year term of office. The current office bearing period commenced April 2019 and will end on March 2022. The office bearers are for 2019 - 2022

- Chairman: V Lascelles – Board member for Forestry (small growers)
- Vice chairman: J Schoeman – Board member for Agriculture
- Secretary: M Wagner – Board member for Conservation
- Forestry: I Botman – Board member for Forestry
- Forestry: A Van Wyk – Board member for Forestry
- Forestry: F de Wet – Board member for Forestry
- Forestry: J Tait – Board member for Forestry
- Forestry: N Engelbrecht – Board member for Forestry Small Growers
- Forestry: T Dlungwana – Board member for Forestry
- Conservation: D Ballantyne – Board member Conservation
- Municipal/residential: W van Wyk – Board member for Municipal/Residential
- FPA general manager: A Scheepers – LEFPA
- Fire protection officer: P Mthiyane – Mbombela Fire Department

Directors elected by the office bearers are:

- Vaughan Lascelles (chairman)
- Jacques Schoeman (vice chairman)
- Mark Wagner (secretary)
- André Scheepers (LEFPA manager)
- Duncan Ballantyne
- Willem van Wyk

**Resources**

LEFPA manages an airbase at Nelspruit Airfield (FANS) in fire season from 15 May to 15 November with a



LEFPA's recently developed app

bombers are also placed on standby at Nelspruit Airfield on high FDI days", said Scheepers.

In addition, LEFPA hosts three WoF hand crews that can assist LEFPA members with prevention and suppression operations as well as fuelload management out of fire season. These crews are based in Barberton, Nelspruit and Waterval Boven, respectively. "As of 2020, LEFPA also hosts two Forestry Support Programme (FSP) teams with a project manager to assist the Department of Forestry, Fisheries and the Environment (DFFE) in the Bushbuck Ridge area and these teams are based at Injaka", added Scheepers.

LEFPA manages a state-of-the-art fire detection centre with almost 60 high sites and cameras reporting in to the detection centre also based at Canary Walk. The Fire Danger Rating is distributed within the LEFPA operational area via the LEFPA app and all data is collected from more than 30 Vital Weather stations in the area.

LEFPA has also installed the FireWeb information, incident and communications system in order to coordinate, manage and synchronise incident information, resources and reports. FireWeb is a mature web-based information, incident and communications tool, tailor made for fire and rescue services with users on the ground throughout South Africa and more recently within the United States of America and has utilised successfully in national, provincial, district and local government as well as in the private sector.

"For administration, historic data of incidents in excess of 18 000 plus fire data from FIMS has been incorporated into FireWeb allowing for some really comprehensive reports and trends to be generated. For dispatch, aerial support and reporting, the immediate capturing of aircraft movement for all to see on the

incident is now possible. Added to this, for resource management, the incident commander is able to see either on his laptop or on the phone app what resources are at the incident. Vehicle movement of other available resources can be monitored in a single place", said Noël Harrison of Uniti FireWeb.

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# Command Corner: Frontal assault on a wildfire

By Chief Tim Murphy, US Forest Service Africa Disaster Management Technical Advisor

Attempting a frontal assault on a wildfire is recognised as Watchout Situation #10 and is a potentially dangerous tactic. If your tactics include a frontal assault, the following checklist must be adequately addressed before engaging the wildfire:

- Has the fire been scouted and sized up? Who will scout and size up a fire and what are they looking for?
- Is your position defensible? List what makes a fire fighter's position defensible ie anchor points, safety zones, escape routes, etc.
- Are escape routes and safety zones adequate? Review what constitutes an adequate safety zone and escape route.
- Do you have an anchor point? How would you establish an anchor point for a frontal assault on a fire?
- Do you have adequate resources to complete the

assault? Discuss things you need to consider, for example, if the frontal assault fails, do you have backup?

- Are you informed on strategy, tactics and hazards? Consider what could happen if someone has a different approach than you ie, the incident commander has a burnout operation planned while you are attempting frontal assault.
- Is the terrain favourable to holding the fire? Discuss ways the terrain will influence where you will make a stand.
- Are you relying on aircraft for support operation? Any operation, especially frontal assault, should not need air resources to be safe.

In order to reduce the risks, reassess your tactics, post lookouts, identify situations in which fire fighters may be enticed to attempt frontal assault on a fire. Review why this may or may not be a good idea. 🔥

- ▶ FireWeb has an integrated mapping solution, bringing the power of own GIS systems into the dispatch and reporting function. This allows for the grouping of all incident information on a single record, multi-day fires included. Occurrence book entries, media such as photos, videos and voice notes as well as polygons and attachments all archived with the incident for audit purpose. FireWeb serves as a powerful statistics database allowing for a wide variety of reports ranging from incident hotspot reports through to trend analysis reports.

LEFPA manages all different resources, either owned or contracted, from an aerial and ground resource



perspective and generate performance reports on resources and associated drivers and/or pilots. Log book entries can be exported for a period or resource and analysed per incident, per region, per dispatcher, per dispatch centre, per season etc. Tariffs can be allocated and real-time cost estimates performed for incidents from a manpower, aviation and vehicle perspective and FPA responses linked to a member fire, saving time in populating that data a second time (for the member).

The FireWeb Live Chat assists service providers, other dispatch centres and other services using the same product as well as members. FireWeb has a mobile reporting application that enables foresters and other members to capture their incidents/fire (emergency and controlled) with information such as: description, location, time, photos, videos, voice notes, polygons with estimated hectares/metres and additional reporting meta required.

The FireWeb system offers major time saving in collecting captain's logs, route forms and other FPA supporting documentation as the incident is simply linked and allows for the uploading of all supporting evidence for inclusion in reporting or for audit queries ie insurance etc.

Scheepers concluded, "LEFPA has a very successful awareness programme in the farming community and the old 'Bokkie' has now become a super hero". 🚒

## Placement/location of fire belts

By Tiaan Pool, lecturer, Wildfire Management, School of Natural Resource Science and Management, Faculty of Science, Nelson Mandela University George Campus

Chapter four of the National Veld and Forest Fire Act (NVFFA - Act 101 of 1998), instructs landowners to prepare firebreaks on their boundaries: 12. (1) Every owner on whose land a veldfire may start or burn or from whose land it may spread, must prepare and maintain a firebreak on his or her side of the boundary between his or her land and any adjoining land.

Because these boundary firebreaks are usually planned and then constructed, they are referred to as fire belts. The purpose of a boundary fire belt is clearly to prevent a fire from either escaping or entering a property. Unfortunately, extreme fire events do not respect fire belts or boundaries and often jump over fire belts into neighbouring properties. One may therefore argue that no fire belt will ever be constructed in a manner that it provides 100 percent protection from veldfires.

This may be true but the effectiveness of fire belts is subject to what is reasonable. A fire belt should be effective enough to provide a reasonable chance that it will stop a fire under reasonable environmental conditions such as weather, vegetation and topography, from escaping from or entering a property. As fire belt construction is very expensive, it is often not done effectively.

It stands to reason that if a fire belt is constructed in such a way that it does not give the landowner a reasonable chance to stop a fire, it does not meet the minimum criteria of an effective fire belt. If it can be proved that a fire belt does not meet the minimum criteria, the landowner can be judged as being negligent. Negligence arises where someone acts without taking proper care; they have not acted as a "reasonable person" would have acted. In addition to boundary belts, landowners also prepare internal belts that divide the property into smaller units.

Reasons why fire belts fail include:

- Not prepared on time (too early in the fire season)
- Poorly prepared (not clean enough)
- Too narrow
- Wrong location
- Wrong orientation

This article will aim at providing landowners with some alternatives that might assist them to construct more effective fire belts at a possible lower cost.

The departure point for all fire management decisions is a firm knowledge of the local fire environment such

as fuels, weather and topography, as well as typical fire behaviour in the area ie the manner in which fuels ignite, the rate of its spread, fire intensity, flame height and its ability to cause spot fires ahead of the fire front. Critical information to consider when choosing a location for a fire belt will therefore include the following:

### Can I use the topography to my advantage?

A fire belt located across a slope is always less effective, as fire spread faster up-slope with taller flames than on a level area. For a belt to be effective in a steep slope situation, it must be two to three times wider than a belt located in a level area. This will not only come at an extra cost but will make the belt area more vulnerable to erosion. It is therefore always better to locate a belt at the bottom of a slope or on the down-wind side of the crest/ridge of a mountain.

In Figure 1 the dominant wind direction is indicated with black arrows. When the dominant wind blows it will be affected by the mountain ridge and a wind-eddy will form on the downwind side of the crest, indicated with the blue circle. This will cause an opposite wind direction in relation to the dominant wind. A fire driven by the dominant wind will therefore be met by an opposing wind once it reaches the ridge of the mountain. In addition to the opposite wind, the spread rate of the fire will also slow down as it starts to burn down-slope. The black line in Figure 1 therefore indicates the ideal location for a belt. Figure 1 may be an extreme example of a sharp ridge but the science holds true for all mountainous terrain. ▶

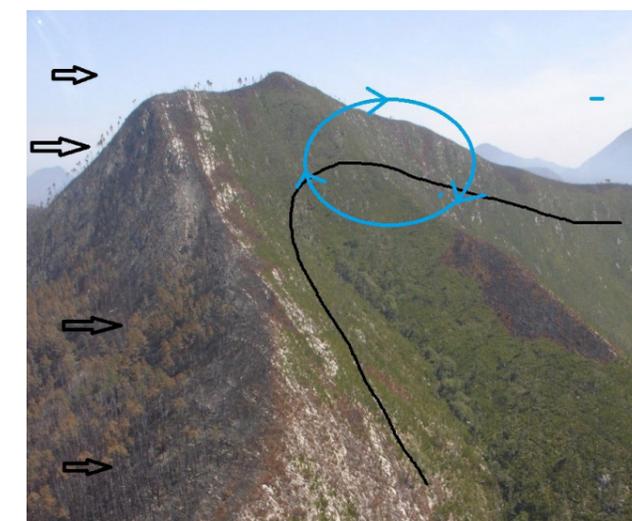


Figure 1: Down-wind side of a mountain crest

▶ Another option to consider when locating a fire belt, is to construct the fire belt parallel to the slope direction (Figure 2). Although this pose a higher risk to soil erosion, the logic behind it is that the belt will encounter a flank fire when a fire burns upslope. The head of the fire will spread fast upslope but slower on the flanks where the belt can stop it.

Also take note of the change of the aspect in Figure 2 where this belt was constructed. Orientation on a slope refers to the direction it is facing. In this case, it is important to note that there will be a change in wind direction if it blows across the area where two slope aspects come together. This can be used to the advantage of the fire manager because if a fire jumps across this belt, it will change direction.



Figure 2: Fire belt constructed parallel to the slope but where two slope aspects meet

Areas that should be avoided when constructing belts are features like chutes and saddles. Wind is accelerated when it encounters these topographical features and a belt constructed across them, should be much wider to prevent fire jumps. Culverts of roads should also be considered when planning a fire belt because wind is funnelled and accelerated through them. There are many examples of fires crossing to the other side of a road by blowing sparks and embers through a culvert. The culvert acts a chimney and causes a venturi draft effect that sucks the fire through.

**Can I use the dominant wind direction to my advantage?**

Wind is the single most influencing force in nature that changes fire behaviour. Fire managers not only have to constantly be aware of wind speed but also wind direction when either suppressing fires or when planning the location of fire belts.

Before choosing the location of a fire belt, the dominant wind direction during high fire season must be identified. In the biggest part of South Africa, the north west (NW) wind is the nemesis of fire managers. The berg-wind that drove the 2017 Knysna Fire as well as the 2018 Herold Fire, which killed several people in the Farleigh Village, is proof of this. August is also known as the 'windy'

month in many regions. In other parts of the country the dominant fire-wind direction may differ and in the Cape Peninsula the south easter (SE) wind is responsible for many extreme fires. The local topography will, however, influence the general wind direction and ultimately determine the dominant wind direction.

Most veldfires tend to burn in the same areas from time-to-time and they follow the same pathway in doing so. The path that a fire will follow is determined by the combined effect of topography and wind. This knowledge should guide fire managers when they select a location and orientation of a fire belt.

The most effective fire belt should be orientated to intersect a fire path at a 45 degree angle. Figure 3 explains the logic of this statement. It is clear from this sketch that the smaller the angle between a fire path and the belt, the longer the distance that the fire must jump to cross the belt. Changing the orientation of a belt can, however, be challenging as it may result in a much longer belt (higher cost). Sound judgement is therefore required to determine the location, orientation and width of a fire belt.

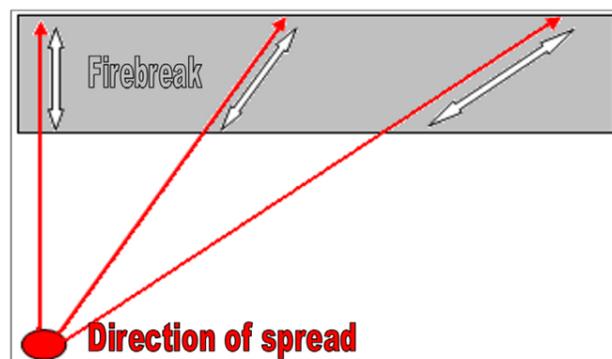


Figure 3: 45 degree orientation of belts in relation to dominant wind

In cases where an angled fire belt is not possible, a parallel fire belt may be considered. A parallel fire belt is constructed as part of a belt system and belts are orientated to be parallel to the dominant wind direction (Figure 4). As in the case with the belt constructed parallel to the slope (Figure 2), the science behind a parallel belt system is to box the flanks of the fire in and keep the head narrow. A cut-off belt can then be constructed and used for a counter fire or a defensive fire suppression action.

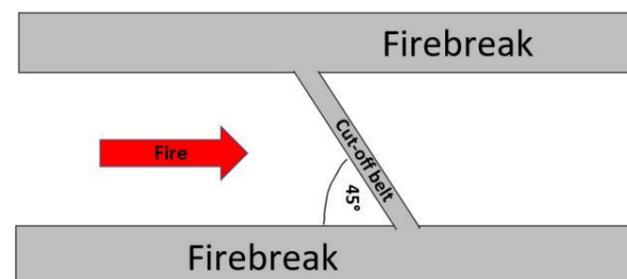


Figure 4: Parallel fire belt system with cut-off belts

**Locating a belt according to the fire path**

Prof Coert Geldenhuys did ground-breaking research on the occurrence and shape of the indigenous forests in the Tsitsikamma and Southern Cape (Figure 5). His studies concluded that:

- A. Indigenous forests exist where they are sheltered from the dominant wind that drives veldfires (wind shadow).
- B. The shape of the forests is determined by the path that veldfires follow through saddles and gorges in the mountains.

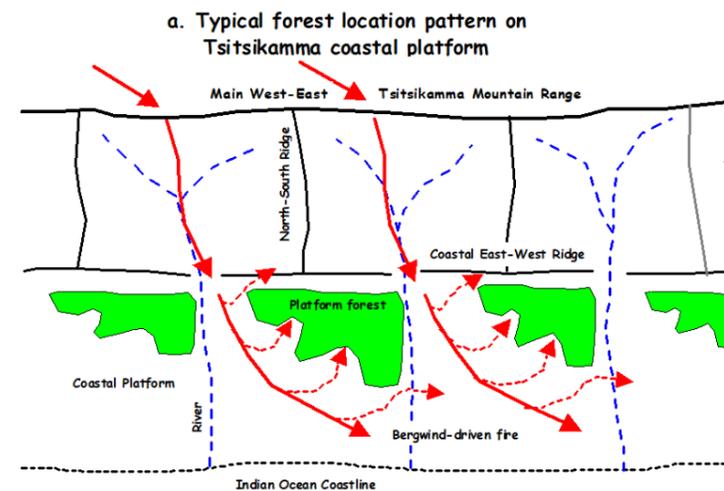


Figure 5: Fire paths in the Southern Cape (Geldenhuys, 1994)

From the research of Prof Geldenhuys it becomes clear that the shape of the land (topography) has a significant influence on the path that fires follow and where they burn or don't burn. In Figure 6 the fire path as determined by the dominant wind and the shape of the terrain is explained.

If one studies the landscape and identifies areas where vegetation that does not normally burn in veldfires exist, it becomes easy to determine fire paths. Figure 6 also indicates where/how the fire usually jumps across the fire independent vegetation. It now becomes clear that the area where spot fires usually land are the logic place to locate a fire belt.

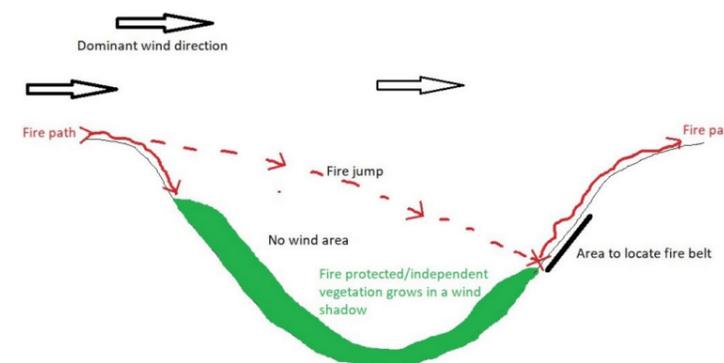


Figure 6: Shape of the land determining the fire path.

Figure 7 is a picture frame of a landscape where fire usually burn and don't burn. Fire managers should use this information to locate fire belts where it will disrupt fire paths



Figure 7: Fire independent vegetation in areas protected from the fire path (Google earth, 2021)

Other considerations before the location of fire belts should be decided include the following:

- As short and straight as possible to save on costs
- Accessible to vehicles where possible
- In conjunction with existing firebreaks (natural and man-made – Figure 8)
- Where it is easy to construct
- Where fuels are less hazardous
- Next to high risk areas



Figure 8: Fire belt constructed next to a road

**Constructing belts across boundaries**

A final question that needs to be answered is the one about locating belts on boundaries between properties. Although the National Veld and Forest Fire Act instructs landowners to construct belts on their property boundaries, these belts may be very ineffective because they are constructed in the wrong place. Moving a belt a short distance across property boundaries, may result in a much more effective belt. It may also reduce construction cost.

# New association for wildland fire fighters launched



A new association for wildland fire fighters has been launched in South Africa. The Association for Wildland Firefighters (AWF) represents the wildland fire fighting industry and associated professionals in Southern Africa.

"Numerous investigations into some disastrous fires in Southern Africa highlighted the need for a formal body to represent the needs of the wildland fire fighter. The AWF aims to develop the knowledge, skills, understanding and competence of wildland fire fighting

in South Africa," said Etienne du Toit, chairperson of the AWF.

Du Toit said the organisation aims to improve the standards of safety and the working environment for fire fighters in the sector in which its members operate.

The Association is a Non-Governmental Organisation (NGO) and is registered as non-profit generating or NPO. Any person or organisation associated with the Wildland Firefighting/Integrated Fire Management fraternity qualifies to be members.

Du Toit said when it comes to wildfires, climate change has resulted in a significant increase in risk, not only to responders but also to civilians. "Monetary losses and other damages as result of these fires annually exceed hundreds of millions. More needs to be done to address these risks. This is where the AWF comes in, an organisation that aims to share learning in such a manner that it promotes professionalism, reduces responder and civilian risk and at the same time allows for continuous

improvement in all aspects of integrated wildfire management."

The new association specifically addresses the needs of the wildfire fraternity. "Until now, no other association specifically addressed the needs of the wildfire fraternity, there are similar associations but these are more focused on the structural fire fighting sector," said Du Toit.

The founders of the organisation come from a variety of backgrounds, including the fire service/ forestry and conservation sectors and include business development practitioners with vast practical experience in these respective sectors. "This Association seeks to enhance synergies between the various entities responsible for wildfire and integrated fire management and one of the main aims is to professionalise the wildfire fighting industry in South Africa."

Visit [www.wildlandfire.org.za](http://www.wildlandfire.org.za) or follow them on Facebook <https://www.facebook.com/Association-of-Wildland-Firefighting-101802995515048>. 🔥

► In the spirit of integrated fire management, adjacent landowners should agree to construct 'boundary fire belts' in locations where they will be more effective. With the support and input of the local fire protection association (FPA) or local municipal authority, the merit of alternative locations for boundary belts should be agreed upon, documented and implemented.

If this practice is followed, it will improve fire protection across regions.

## Conclusion

The value of a well prepared and effective placement and correct orientated fire belt has been proved many times. Climate change, economic pressure on landowners, political and social interferences is only

a few reasons amongst many others why the losses suffered as a result of unplanned veldfires are escalating in the global arena.

It is becoming clear that modern fire managers must do things differently. We can no longer dwell on expired practices from the past and trust that we will still be able to curb losses caused by uncontrolled fires. Fire management has become a scientific art form where fire managers must combine science, human resource management, technology, good communication and many other skills to make a difference.

By redesigning fire belt systems in our regions, we can move closer to fulfilling the ideology of integrated management. ▲

# The Garden Route in flames: Chapter V - Handling the impact of the wildfires on weed infestation

A book by Dr Neels de Ronde

The following article is the forth in the series of excerpts from a book written by Dr Neels de Ronde, The Garden Route in flames. Dr de Ronde lives in Sedgefield in the Southern Cape, South Africa and has done extensive research in the field of land management and wildfire prevention. Dr de Ronde gave permission to Fire and Rescue International to publish the book in the magazine in separate sections for the benefit of all forestry and wildfire managers, fire protection associations and land owners in order to gain insight and an understanding of the intricacies that form the basis of such extreme fires and how it can be prevented, highlighting effective fuel management and fire prevention measures.

## 5.1 History of exotic weeds in the region

Some of the worst weed problem areas in the Garden Route region have been burned over by the Knysna and Outeniqua wildfires. The impact on the degree of weed infestations after the wildfires has as yet not been properly assessed, but I believe serious attempts are being made to combat the weeds after both fires.

The weed problems can basically be divided into two groups, namely:

- Those weeds present in the fynbos covering the Mountains, including in the foothills (such as Hakea, Pines), and
- The weeds present on the lower Garden Route plateau, mainly within the fynbos (Strandveld) growing on the sand dunes (such as Acacia spp., ie A. Cyclops).



Photograph 14 Picture of effectively-burning of Setaria weeds inside a mature Pinus elliottii stand in Mpumalanga (Photograph taken by unknown photographer).

The Pine weed problem is related to off-site species planted in the foothills area of the Outeniqua Mountains, which produced an abundance of seed, spreading from there into the mountain fynbos. It will be mainly the fynbos in the Outeniqua Mountains which will be affected by the wildfire experienced there. Firstly, the younger Pine trees will still not be carrying seed-productive cones, which will be killed by this fire and not form anymore seeds in the future. Secondly, the older Pine trees subjected to the fire, will by now have been regenerated in abundance from the seeds shed by the 'mother trees', which most probably survived the fire.

It is thus the last category of 'seeder trees', which should get attention from the 'eradication teams' as soon as possible, as this will not only be

the cheapest way of eradication of the weed by means of pulling out the seedlings with a year or two after the 2018 fire. This means that these 'seeders' have to be identified and mapped as a matter of urgency and be eradicated soonest, with follow-up checks on any regeneration left after first treatments.

The weeds growing within the coastal fynbos (Strandveld) were mostly not exposed to the fires, with a few exceptions, such as the Featherbed Nature Reserve, near the Heads, Knysna. However, otherwise fire exposure to serious weed problem areas was a rare event in the Garden Route Strandveld areas during the 2017/18 wildfires. Subsequently, future weed problems can get attention soonest as these are mostly found in relatively restricted areas and should be

► treated by means of a focussed weed eradication program.

Because the Outeniqua Mountain range was almost completely burned out by the 2018 wildfire, the planning team from 'Working for Water' should make use of before and after fire satellite images to map known weed problem areas within this burned over land, so weed eradication programs can be prioritised, budgeted for and systematically get attention.

### 5.2 Incorporating weed eradication

programs in fire prevention plans. The regional fire prevention plan for the Garden Route region should also be used to advantage to attend to weed eradication programs within the main buffer zones of the region. Fire managers responsible for the development and maintenance of the main (regional) buffer zones, should also be aware of weed problem areas within these buffers. The fire managers should consult with Working for Water scientists or Universities, how their prescribed burning programs can best be used to eradicate the weeds successfully and effectively where prescribed fire is applied, for the fire prevention programme discussed earlier in this writing.

Where the main buffers are crossing private property, the eradication of weeds should also receive the necessary attention. Where property owners do not have the capacity to attend to their weed problems properly, assistance from the Provincial or local Governments should be considered to ensure proper (systematic) weed eradication. Legal steps should be considered where private property owners fail to attend to their own weed problems, particularly where such problem areas are falling within the fire prevention buffer zone program.

### 5.3 Attending to weed problems within Industrial Pine plantations

Where *P. radiata* still forms the most prominent species used by private timber growers, weeds can develop faster to become a more serious problem as where the ex-Government (Safcol) plantations are

growing. This is because in most plantation stands *P. radiata* is the dominant species on private land.

In Safcol plantation stands most of the (off site) *P. radiata* stands have been converted to *P. elliottii*. The latter has a much faster tree canopy closure rate (at approx. 10 – 12 years of stand age) than the first (only after 15 – 20 years will crown canopies of this species close). This can mainly be attributed to the thinner crown form of the *P. radiata* species.

Where most of the private *P. radiata* plantations are situated on the Garden Route plateau, a substantial area was burned over by the Knysna wildfire and these areas will be easier exposed to weeds because of its later crown canopy closure, as explained above. This impact might well be counteracted by dense natural regeneration after the fire. This will suppress any weeds developing there. Where natural regeneration of *P. radiata* is sparse or absent, weeds can get a 'foothold' and these areas should be included in the weed eradication programme.

The Outeniqua Mountain foothills have a mix of 'exit' plantation blocks, blocks that have been taken out of the 'exit' programme (thus not converted to fynbos) and then the remaining plantation, unaffected by the exit programme, which still fall under Safcol control. I will refrain from pointing finger at this rather chaotic conversion programme but it is a fact that management of this programme failed in many respects. Subsequently, fire was excluded from clear felled stands, and weeds also had a chance to develop unhindered.

The massive control of all the natural regeneration in burned over *P. rad.* stands, will be a mammoth task during coming years, which I doubt if the local timber companies can handle. However, if they can manage to stay abreast of this programme, such action will also present a perfect opportunity to check and eradicate weeds within the plantations burned over by the two wildfires, which will also be ideal for future fire prevention

purposes. This will also be an opportunity to strengthen buffer zones, particularly where national roads are carving through such plantation blocks and such clearing can be applied hand in hand with the removal of burnable material within these buffer zone areas.

I do not know what the status of the 'exit' programme is today but know that a substantial area was burned over by the Outeniqua fire and in these neglected areas, not only will weeds develop in abundance but the affected land will soon present extreme fire hazards again. It is for this reason that I proposed to develop the main buffer zone "B4" (Photographs 9 and 10), to protect the Garden Route plateau from future fire hazards, as well as the added (predicted) extreme fire hazard expected to develop along the foothills, south of the Outeniqua Mountains. I will discuss the creation of this vital buffer zone in detail in following chapters of this writing.

### 5.4 Streamlining the weed eradication program

This programme is not just the responsibility of the Working for Water section of the Department of Environmental Affairs but ALL landowners and land managers are responsible for the weed control on their properties. Subsequently, weed control will have to be attended to at regional level and here the authorities responsible for the creation and maintenance of the regional fire prevention plan will have to come in to manage weed control within the main regional buffer zones as well as all land treated for fuel reduction programs within the region.

Most weeds, if left uncontrolled, will eventually present an abnormal fire hazard, which has to be avoided at all cost, and will also have to be addressed by the regions' fire managers. Subsequently, I would like to see that satellite images from before and after the fires are used to advantage to map serious weed "hot-spots" on fire prevention maps, and that they are subsequently being treated to eradicate the weeds, with follow-up programmes.

Regional fire prevention planners will also have to identify land without proper management and/or control, and take steps to ensure that such properties are marked as "unmanaged" and that steps are taken to see that weeds are still being managed on such lands in some alternative way. This is particularly necessary if this concerns the weeds affecting the main regional buffer zone maintenance. Legislation will also have to be checked to enforce such measures where possible.

### 5.5 Optimum use of unemployed workers to be employed for weed eradication programs

I am of the opinion that the added weed problem in the Garden Route area as a result of both wildfires will require additional manpower to check and get under control. I believe that steps have already been taken to add attention to the eradication of the weeds after both wildfires, and this is appreciated.

All I can comment to this is to ask if any proper mapping and use of remote sensing of the problem has been conducted so far, with attention to the classification of the weeds at this stage, and if scientists have attempted to use this information to extrapolate predicted weed levels in say five and 10 years' time. If this is not the case, the development of such tools is strongly recommended.

Likewise it would be nice if the areas infested by the weeds could be modelled to create fuel models for each, over time (age). I am not in a position anymore to conduct such tasks, although I can make myself available for consultation and training how to conduct such tasks, if and when required, with or without the assistance of remote sensing. Such fuel models could assist greatly in 'tuning up' the region's fuel model database for a range of different purposes, such as

(i) fire hazard rating classification adjustments, (ii) updating the regional fuel model sets and (iii) checking specific sections of the regional buffer zones' width specifications, for effectiveness against wildfire threats.

### 5.6 Fighting indigenous and exotic weeds

Examples of how controlled backfires can be applied to fight weed species can be found on Photographs 4 and 14. Where dense *Kystervaring* (*Gleichenia polypodioides*) has developed inside Pine stands, a high intensity backfire can be used for this purpose, as is illustrated on these photographs. Likewise, *Setaria* spread can also be checked with high intensity backfires, to keep crowns safe from scorch (Photograph 14) but this weed is fortunately not a problem weed along the Garden Route. Where *Acacia* spp (such as *A. Cyclops*) have infested the



Photograph 15: A *Pinus pinaster* stand in the Tsitsikamma where a controlled fire was applied one year earlier. Note the abundance of palatable grass development from a seed source triggered by the 'ash-bed effect' caused by the prescribed fire applied. Another aspect was that patches of *Gleichenia polypodioides* fern weed within this stand, where also eradicated by the fire (Photograph by C de Ronde)



## Helicopter rescue: First performed by the US Army Air Forces in April 1944 during World War II in Burma



Second Lieutenant Carter Harman, United States Army Air Corps. (US Army)

**21** April 1944: The first military helicopter combat rescue began with Lieutenant Carter Harman, US 1st Air Commando Group, being ordered to proceed from Lalaghat, India with his Vought-Sikorsky YR-4B, 43-28247, 965kms to Taro in northern Burma during World War II.

Technical Sergeant Ed "Murphy" Hladovcak, pilot of a Stinson L-1A Vigilant liaison airplane, had crashed in the jungle behind Japanese lines while transporting three wounded British soldiers. Lieutenant Harman was assigned to attempt to rescue the four men. It would be a marathon operation.

It took Harman and his Sikorsky 24 hours to arrive at Taro. After a brief rest and dip in the river to cool off, he continued for another 202kms to an airstrip in the jungle called 'Aberdeen', which was well behind the enemy lines. It was from here that Sgt Hladovcak had been operating, flying out wounded soldiers. From Aberdeen, Harman was led to the location of the downed men by another liaison airplane. The survivors were surrounded by Japanese soldiers who had found the crashed airplane and were trying to locate the four men.

Because of the high heat, elevation and humidity, which increased the density altitude, the YR-4B's air-cooled engine was unable to produce its full rated power. Also, the helicopter's rotor blades were not as effective as they would have been at lower density altitudes.

Harman planned to lift one of the survivors out of the clearing in the jungle and fly a short distance to a sand bank where other L-1 or L-5 liaison airplanes could pick them up and fly them back to Aberdeen. He would repeat the operation until all four men had been rescued. However, it took the rest of the day to airlift just the first two wounded and very sick soldiers.

### Distinguished Flying Cross

On the second flight, the helicopter's engine was overheating and on landing it seized and could not be restarted. Sergeant

not only these sensitive interfaces but also creating a fuel bed through which forest edges were exposed to serious fire damage.

Such exposed or damaged forest edges need to be protected on the non-forest side of these forests, by means of keeping a strip of about 20 to 50m free from available fuel, to give these forest edges a chance to recover from the natural seedbeds. Such exposed and sensitive edges should also be kept free from Acacia regenerated weed, by pulling such regenerated trees out as they come up and develop from the forest floor there.

A unique area infested with mainly Acacia mearnsii is situated in the Maalgate area, within the depressions created there by the rivers. The history of this infestation dates back to when the species was established for the trees' bark production to be used for the tannin process to prepare leather used for the shoe factory there during the late 19th Century/early 20th Century. The seeds from these Acacia trees then spread into the rivers, where these developed the "Acacia jungles" now found in the area along the river banks. Felling of trees for firewood by farmers in the area, assisted in further spread of this exotic weed within the Maalgate area.



Lt Carter Harman hovering in ground effect with Sikorsky YR-4B 43-28247 at Lalaghat, India, March 1944. This is the helicopter with which he made the first combat rescue, 21 - 25 April 1944. (US Air Force)



Distinguished Flying Cross

Hladovcak and the remaining soldier were still in the jungle, Lieutenant Harman was stuck by the river bank and Japanese soldiers were everywhere.

On the morning of 25 April Lieutenant Harman was able to get the helicopter's engine to start and again, one at a time, he rescued the two remaining survivors. A liaison plane flew out the wounded soldier while Hladovcak rode along with Harman back to Aberdeen. He had never seen a helicopter before.

For his actions, Lieutenant Carter Harman was awarded the Distinguished Flying Cross.

Sikorsky YR-4B 43-28247 was condemned 31 December 1944.

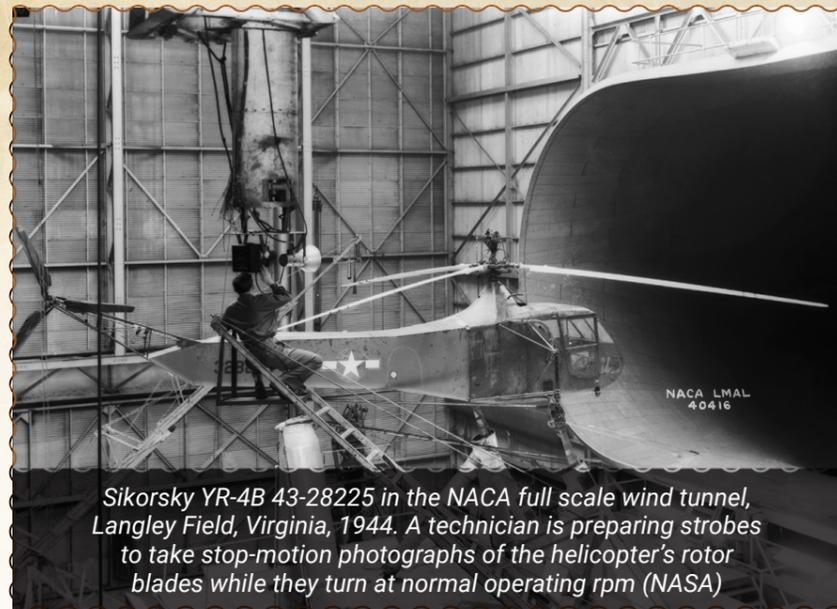
The Sikorsky YR-4B was a two-place, single-engine helicopter with a single main rotor and an anti-torque tail rotor. The fuselage was 10,881m long with a main rotor diameter of 11,582m. The tail rotor was 2,496m in diameter. Its overall length, with rotors turning, was 4,716m. The helicopter had an overall height of 3,785m. The empty weight was 916kgs and maximum takeoff weight of 1,152kg. The helicopter's fuel capacity was 113,6l.

The main rotor consisted of three tapered, fully-articulated blades built of chrome-molybdenum steel spars and spruce plywood ribs, with laminated spruce, balsa and mahogany forming the leading edge and a flexible cable forming the trailing edge. The blades were covered with two layers of doped fabric. The three-bladed semi-articulated tail rotor was built with a spruce spar and

alternating laminations of maple and mahogany, covered with fabric. Both the main and tail rotors had a thin brass abrasion strip covering the leading edges. The main rotor turned counter-clockwise, as seen from above. The advancing blade is on the helicopter's right. The tail rotor was mounted on the helicopter's right side in a tractor configuration. It turned clockwise as seen from the helicopter's left.



Lieutenant Carter Harman, 1st Air Commando Group, (standing, left) with Sikorsky YR-4B 43-28223, Burma, 26 April 1944. The other officer standing next to Harman is Lieutenant Frank Peterson. Harman's crew chief, Sergeant Jim Phelan, is kneeling at right. (US Air Force)



*Sikorsky YR-4B 43-28225 in the NACA full scale wind tunnel, Langley Field, Virginia, 1944. A technician is preparing strobes to take stop-motion photographs of the helicopter's rotor blades while they turn at normal operating rpm (NASA)*

American Whig Society, Princeton University Band, and the Princeton University Choir. Harman enlisted as a private in the United States Army at New York City on 1 April 1942 and was assigned to the Air Corps. Enlistment records indicate that he was 170,2cms tall and weighed 57kgs.

After World War II ended, Harman returned to his musical studies at Columbia University, New York City, receiving a master's degree in 1949. Harman worked as a music critic for The New York Times and Time Magazine and also continued writing books, as well as composing for ballet and opera. He was also a music producer and became executive vice president of CRI Records (Composers Recordings, Inc).

Carter Harman was born at Brooklyn, New York, 14 June 1918, the son of Steven Palmer Harman, a newspaper editor, and Helen F Doremus Harman. Before the war, Harman had been a musician and author. He assisted Duke Ellington write an autobiography. Harman earned a bachelor's degree in music composition from Princeton University, Princeton, New Jersey, in 1940. While at Princeton, Harman was a member of the Dial Lodge,

Harman was married three times. He married Nancy Hallinan, 5 February 1946, however, they later divorced. His second wife was Helen Scott. They had four children together. His third wife was Wanda Maximilien. Carter Harman died at Berlin, Vermont, 23 January 2007 at the age of 88 years.

Sources: This day in Aviation, written by Bryan R Swopes ▲



*Lieutenant Carter Harman in the cockpit of Sikorsky YR-4B 43-28223, Burma, 1945*

► The advancing blade is below the axis of rotation.

The YR-4B was powered by an air-cooled, direct-drive 9,1 litre Warner Super Scarab SS185 (R-550-3) seven-cylinder radial engine with a compression ratio of 6.20:1. The R-550-3 was rated at 185 horsepower at 2 175 rpm at Sea Level and 200 horsepower at 2 475 rpm (five minute limit) for takeoff. The engine was placed backwards in the aircraft with the propeller shaft driving a short driveshaft through a clutch to a 90 degree gear box and the transmission. The R-550-3 weighed 156kgs.

The R-4B had a cruise speed of 105kms per hour and maximum speed of 132kms. The service ceiling was 3 658m and range was 253kms. The YR-4B was equipped with bomb racks. It could carry three 56,7kg demolition bombs or one 147kg depth bomb. The equipment was deleted for the R-4B.

Sikorsky built 27 YR-4Bs and 100 R-4B helicopters. Of these, 40 were assigned to the Army Air Corps, 19 to the Navy and Coast Guard and 41 were sent to the Royal Air Force and Royal Navy.

## Grief



Such a simple word, almost too simple.  
The myriad of emotions, utter sadness, denial, anger, encompassed in that one word makes it seem as though it should be so much more complex.  
There is no perfect playbook for processing grief, no cemented timeline or linear progression, no algorithm or how-to guide that explains what to feel and when.

Grief can be paralyzing.  
We can sit in our sadness and anger and denial longer than our minds and hearts are capable of processing. The unrelenting waves of emotion can rob us of our future and make us jaded to the good around us.

Enter hope.  
Hope is the sister of grief. In hope there is healing, there is change, there is a future. Hope reminds us that grief is not where we will be mired forever. It's the gentle light of daybreak in the seemingly endless dark of night.

So we grieve. We grieve together, shoulder-to-shoulder with compassion for where each of us is at in these uncharted waters.

And if the night gets too dark and some of us lose sight of daybreak on the horizon, let us gently remind each other of the hope that tomorrow can bring.

Source: Los Angeles Fire Department Peer Support