

FIRE **AND** RESCUE INTERNATIONAL

Integrated fire, rescue, EMS and incident command technology

Volume 7 No 1



Photo: Simon McDonnell



**NATIONAL
SEA RESCUE
INSTITUTE**

To the fire fighter

The Guardian Angels in our life
Are those who chose to serve
Those who sit there waiting
What's around the next curve

Men and women who have dedicated
Their very lives to us
Who face the dangers daily
To you our lives we trust

These wonderful selfless people
Will be there when we call
No matter what danger they face
They always give their all

The fire fighters needs come last
when that siren blows
He is running to protect us
For time is short he knows

They put their lives on the line
For strangers they never met
But the care and protection given
Is truly without regret!

I want to thank the fire fighters
For everything they do
You give us all great comfort
In the work that you pursue

From each fire that you fight
To each child that you save
To the vision of a crumbled car
To the comfort that you gave

We thank you for all you've done
For all that will come to be
We pray for each one's safety
God provide each fire fighter's needs

Be with each one as they struggle
Through the pain they will face
Give them strength to carry on
Rain down on them your Grace.

For each of them are Angels
Sent to help us along the way
What precious dedication
That could never be repaid

Written by Linda Etling, 2009

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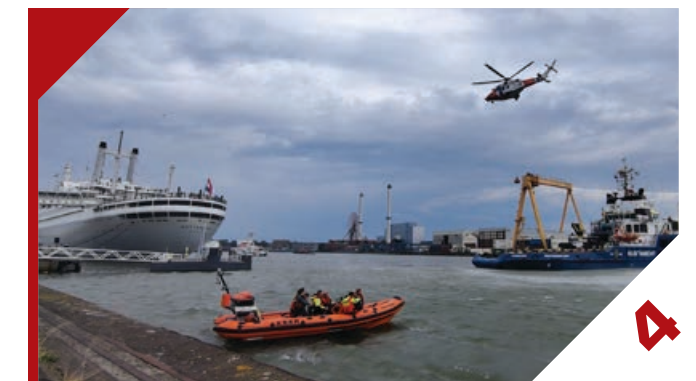
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Comment

Our 60th edition of **Fire and Rescue International (FRI)**! What an honour it has been to serve those who serve. To all our contributors, thank you for sharing your expertise!



Lee Raath-Brownie

Fire and Rescue International remains dedicated to serve the emergency services and first responders and share technical and research articles, inspirational leadership guidance as well as practical hands-on advice for daily use. Enjoy the read!

New equipment

George Municipality recently took delivery of new additions to its fleet including a refurbished Scania major pumper, a Toyota Land Cruiser with a skid unit, a rescue vehicle also built on a Toyota Land Cruiser chassis and a Polaris 4x4 vehicle with trailer.

Industrial and petrochemical fires

We look at the types of fire protection for storage tanks, the new Anaconda Hose Retrieval Vehicle from Industrial Fire and Hazard Control, we profile the international group, Large Atmospheric Storage Tank Fires (LASTFire) and share effectiveness and functional safety for fire and gas systems from SA Fire Protection available in South Africa through DoseTech.

Mutual aid agreements

Colin Deiner discusses mutual aid agreements (MAAs), why you need MAAs and details a range of points that must be addressed in order to ensure a robust and effective tool for both parties. Deiner also explains the role of the province in MAAs.

Fire fighter health

We share the current research at the US National Institute of Standards and Technology (NIST), where researchers and their colleagues have used a form of artificial intelligence (AI) known as machine learning to accurately identify abnormal cardiac rhythms in fire fighters.

Wildfires

Our focus on wildfires in this edition features the new helitack initiative in the Western Cape to ensure that resources are deployed to the fireline more efficiently. Working on Fire provides an update on the current fire season and we introduce Nelson Mandela University George Campus' new Fire Ecology and Conservation Lecturer, Samukelisiwe Msweli. Chief Tim Murphy's Command Corner features a 'Fire not scouted and sized up!' and we share Chapter VIII from the late Dr Neels de Ronde's book, The Garden Route in flames, discussing the use of photoseries for prescribed burning and wildfire assessment.

We also share some upcoming events and feature some past events for you to visit and partake.

It certainly has been a wonderful ride and we would not have been able to share the information without our local and international contributors. We thank them and our 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

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Congratulations

Wendy Tawse for her photograph 'Bonfire' taken with a Samsung S9 Phone with a 4,30mm F214 1/2008 S ISO 50 lens and a white balance auto and no flash.

Well done!

Wendy Tawse wins this month's prize money of R2000!

Photo description:

Robben Island fuel reduction burn. The fuel reduction burn and training intervention took place on Robben Island between 9 and 14 October 2022 and served as in-field training for City of Cape Town Biodiversity Management and Fire and Rescue Services staff as well as CapeNature staff. The burn was conducted in cooperation with Robben Island Museum who provided accommodation for attendees for the duration of the training.



This month's FRI Images winner!

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!



Maritime SAR community exploring the future of maritime safety at WMRC 2023 in Rotterdam



The International Maritime Rescue Federation's (IMRF) World Maritime Rescue Congress (WMRC) was held in Rotterdam in the Netherlands in mid-June 2023

For the first time in four years, the global search and rescue (SAR) community converged in Rotterdam in the Netherlands in mid-June 2023 for the International Maritime Rescue Federation's (IMRF) World Maritime Rescue Congress (WMRC).

The three-day event, which was co-organised between the IMRF and the Royal Netherlands Sea Rescue Institution (KNRM), was the fifth WMRC to take place following successful events in Sweden in 2007, China in 2011, Germany in 2015 and Canada in 2019. Crucially, the 2023 iteration followed the COVID-19 pandemic, giving many an opportunity to spend time with fellow SAR personnel from across the globe in-person once again.

This year's WMRC was a true reflection of maritime SAR's international nature and the IMRF's membership. More than 500 personnel attended from 137 SAR organisations, non-governmental organisations, commercial organisations and start-ups. Over 43 countries were represented at the event, including those from Africa, Asia, Europe, North America

and South America, including South Africa's National Sea Rescue Institute (NSRI).

WMRC 2023 kicked off on the first day with a live SAR demonstration organised by KNRM in the waters surrounding the SS Rotterdam that involved the Netherlands Coastguard, KNRM and the Port of Rotterdam, as well as vessels from Belgium, Germany, Sweden and the United Kingdom. The event also included a parade of vintage lifeboats from the KNRM and other European SAR organisations to demonstrate how lifeboats have developed over the past 100 years.

The second day of the congress began with a moment's silence to those lives lost at sea in Greece earlier that week. The congress was officially opened by Caroline Jupe, CEO of the IMRF, who noted that the global SAR community



NSRI CEO Dr Cleve Robertson and executive director of Drowning Prevention Dr Jill Fortuin



has a duty to imagine the future, continue to strive to improve their services and identify some of the most important issues facing the industry today and in the future. Jacob Tas, CEO of the KNRM, welcomed all attendees on behalf of the host organisation and amongst others highlighted the fact that every two minutes someone drowns in the world, which needs our collective focus and attention before introducing Jaap Smit, King's Commissioner of South Holland, who spoke passionately about his own experiences with the KNRM and wished all those in attendance a fantastic congress.

Keynote speaker Henk Spanjer, chair of the International Association for Safety and Survival Training (IASST), then took to the stage for his address, which focused on the critical need to improve safety and training operations, including simulators, in maritime SAR. This was followed by a plenary panel on developments in global maritime SAR by the IMRF's board of trustees and chaired by Dean Lawrence from the Royal New Zealand Coastguard.

Following an action-packed first day of panel discussions and workshops, attendees were treated to a special river cruise through Rotterdam, which included a surprise 'Meet the Fleet' escort from the SAR vessels

involved in the previous day's SAR demonstration, bringing all attendees back to the SS Rotterdam safe and sound.

The third day of the congress included several informative and engaging panels discussing topics such as SAR incident planning, ESG strategy development and Mass Rescue Operation workshops.

NSRI CEO Dr Cleve Robertson and executive director of Drowning Prevention Dr Jill Fortuin attended on the Institute's behalf and both gave presentations at the event.

"I talked about our structured training programme and the mix of theoretical training, via eLearning, and practical skills training," says Dr Robertson, adding that there was plenty of interest from the other delegates in the NSRI's eLearning and content.

He also spoke about how the NSRI has transformed from a boat-based organisation to a more human-focused one, and outlined the Institute's sustainability challenge, which was broken down into categories such as diversity, mental health, environment and technology, among others.

"The NSRI is well ahead of other countries when it comes to addressing volunteer security and

care, thanks to robust life and injury insurance, as well as mental health services supplied by Life Healthcare," says Dr Robertson. "We're also ahead when it comes to our gender balance, with 30 percent female volunteers. However, we have loads of work to do in terms of ethnic representivity."

The need for the formulation of Mass Rescue Operation plans was also highlighted.

On the Drowning Prevention front, Dr Fortuin spoke of the positive influence extensive research has had on the NSRI's Drowning Prevention Initiatives. "The feedback was extremely positive," said Dr Fortuin. "We made valuable contacts within the World Health Organisation (WHO) and the IMRF, as well as the Royal National Lifeboat Institution (RNLI). The NSRI is doing well and exceeding international expectations in SAR. This was an excellent opportunity to strengthen our collaborative networks."

The congress formally concluded at the end of this day with closing remarks from Caroline Jupe and Jacob Tas and a farewell reception at the incredible Rotterdam City Hall.

Following the conclusion of WMRC, IMRF members attended the organisation's Quadrennial General Meeting, which allowed

WMRC 2023 kicked off on the first day with a live SAR demonstration organised by KNRM in the waters surrounding the SS Rotterdam



▶ the IMRF to showcase its completed and upcoming work to its membership. The meeting also included the election of its board for the 2023-27 period, in which Jacob Tas was elected as chair and Cia Sjöstedt, CEO of the Swedish Sea Rescue Society (SSRS) elected as vice-chair.

WMRC is the world's most prominent maritime SAR event, bringing together people from all

backgrounds, experiences and cultures to better understand how maritime SAR efforts can be improved to save more lives at sea. WMRC 2023 was a testament to the fantastic work done by the global SAR community over the past four years and a preview of some of the amazing work the industry still has to come.

Some of the most interesting takeaways from the Congress

for Dr Robertson included future technologies that may be employed to enhance SAR efficiency, such as drones, simulations and thermal imaging infrared cameras, as well as new, cutting-edge rescue vessels and rescue equipment, noting that the NSRI is a global leader when it comes to the JetRIB. "The Congress also brought home the need to reduce carbon emissions, with various solutions proposed such as switching to a 'cleaner' form of diesel", said Dr Robertson.

In summary, "We are ahead of the curve and our innovation is being adopted internationally. Delegates were genuinely impressed by our Survival Swimming Centres, Pink Rescue Buoys and other programmes, as well as our fatal drowning data. Many researchers struggle to acquire this quality of data. I think our future is in high impact, low-cost and volume interventions to prevent drowning in the first place", added Dr Robertson.

"We look forward to the 2027 World Maritime Congress in Sweden, when the NSRI will be able to report back on the goals and improvements influenced by this seminal event."



George Municipality's fire stations display four locally manufactured fire fighting vehicles

Junior fire fighter Denmark King and fire fighter Brad Bussack with (middle) Santa Sternsdorf, Johan Brand, newly appointed divisional commander for George Fire and Rescue Services, Sivuyile Mtila, senior manager of Environmental Services, Councillor Charlotte Clarke, Brandon Woolley of Ramcom Trucks, Alderman Leon van Wyk and CFO Cornelius Barnard, (right) fire fighter Moses Mongo, junior fire fighter Simpiwhe Sikhosana, junior fire fighter Heinrich Pienaar



The George Municipality recently took delivery of new additions to its fleet including a refurbished Scania major pumper, a Toyota Land Cruiser with a skid unit, a rescue vehicle also built on a Toyota Land Cruiser chassis and a Polaris 4x4 vehicle with trailer. The Scania major pumper refurbishment,

skid unit and the rescue vehicle was built by local manufacture, Ramcom Trucks based on the Garden Route.

The Municipality is proud to show off the new additions to its fire fighting fleet and the Executive Mayor of George, Alderman Leon van Wyk, accompanied by the portfolio

councillor for Community Safety, Councillor Charlotte Clarke, received the fleet in a special handover event that took place at the George Fire Station on Tuesday, 16 May 2023.

Also present at the official handover of the vehicles were senior manager of Environmental Services Sivuyile Mtila, who represented the Community Services' directorship, the manager for George Municipal Fire and Rescue/ Disaster Management, CFO Cornelius Barnard, the station commander Training, Santa Sternsdorf and the newly appointed divisional commander for George Fire and Rescue Services, Johan Brand.

"I am delighted to be receiving these vehicles that have been specifically manufactured for us by a local manufacturer," said Mayor van Wyk, as he received the vehicles from a local business owner, Brandon



CFO Cornelius Barnard, Brandon Woolley, Executive Mayor Leon van Wyk and Councillor Charlotte Clarke



Manufacturers of Fire Fighting Vehicles

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The new Toyota Land Cruiser skid unit fitted with state-of-the-art polypropylene unit as well as the new rescue vehicle

“Engine 1, built on a Scania chassis, is our major pumper, a vehicle for structural fire fighting, which was completely rebuilt after an accident; we’re very proud to welcome her back to the fleet. Then we have one of our new vehicles a Toyota Land Cruiser V8 with a skid unit fitted with a state-of-the-art polypropylene unit that allows us to increase the water carrying capacity to a 600-litre tank to join the fleet.” The skid unit is fitted with a Davey twin wide medium pressure pump.

“Next, we have the Toyota Land Cruiser V8 rescue vehicle, again state-of-the-art polypropylene canopy that now is being introduced as part of the rebuild for the vehicle where we gain weight advantage but we have a vehicle fit-for-purpose for rescue, with the Jaws of Life and all the needed equipment that we need for mass rescues”, said Sternsdorf.

“Finally, the Polaris 4x4 vehicle allows us to diversify rescue and fire fighting overall; a good off-road vehicle to add to the fleet of George Municipality,” Sternsdorf added.

Photos by Deidré Cloete ▲

▶ Woolley. “We are extremely proud to take ownership and start using these vehicles,” said Cornelius Barnard, manager for Fire and Rescue/Disaster Management. Handing over the vehicles to the George Municipality, Woolley, the director and owner of Ramcom Trucks, a George-based company, said, “We are privileged to be able to build these vehicles for the George Municipality Fire Services out of a new material called polypropylene,

which is very durable, lightweight and I think for the fire department it will be a good addition to their fleet. We are very proud of the vehicles we’ve manufactured and we are glad that we can serve and make a difference in the community with our products.

At the George Fire Station, Santa Sternsdorf, the station commander Training, described each of the four new additions in the George Municipality’s fleet.

George Municipality is proud to show off the new additions to its fire fighting fleet



Types of fire protection for storage tanks

By Ahmed J Al-Subiei, fire supervisor, Saudi Aramco Jubail Oil Refinery (SASREF)

The three main fire protection systems used on tanks containing flammable or combustible liquids are foam sub-surface injection, top-injection (foam chamber) and foam pourer (foam maker).

All three systems can either be fully fixed systems meaning that foam vessels and pumping systems are located within the protected area or semi-fixed meaning that foam is transported via foam trucks to the protected area.

A sub-surface injection system is used on fixed roof tanks where foam is injected at the bottom of the tank, above the water level to avoid the deterioration of the foam. Since this system is a closed system, then a high back pressure generator must be used to inject air to the foam solution entering the tank; finished fire fighting foam consist of foam+water+air. Such a system is not recommended for tanks containing liquids having high viscosity or liquids that are water miscible. This type of system most likely will not be affected by any explosion that may occur at the tank roof.

A top injection (foam chamber) system is also used on fixed roof tanks where foam is injected in the tank on top of the liquid surface. Such a system is generally not recommended due to its vulnerability against tank explosions and open tank fires. However, it may be used when high viscosity or water miscible liquids are stored.

Foam pourer (foam maker) system is used on floating roof tanks, specifically protecting the rim seal area, the area between the roof and tank shell. This system has the facility

to mix foam with air before pouring it gently into the dammed area between the tank shell and tank roof.

It is worth mentioning that fixed roof tanks generally contain combustible liquids (flashpoint above 37,8 degrees Celsius) and floating roof tank generally contain flammable liquids (flashpoint below 37,8 C degrees Celsius).

Knowing the type of liquid is essential for the system design, NFPA 11 requires foam discharge times based on the liquid flashpoint, which is one of the factors for calculating the amount of foam concentrate required.

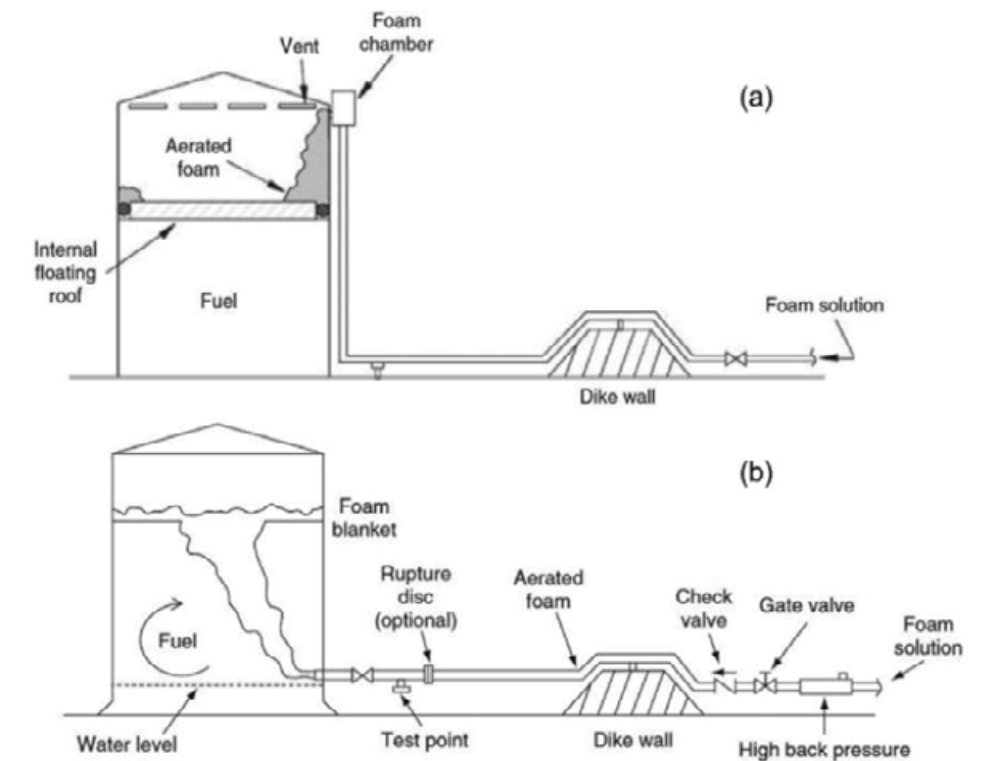
To calculate the quantity of foam required for tank protection you need to know:

1. The type of fuel (flammable/

“Knowing the type of liquid is essential for the system design, NFPA 11 requires foam discharge times based on the liquid flashpoint, which is one of the factors for calculating the amount of foam concentrate required.”

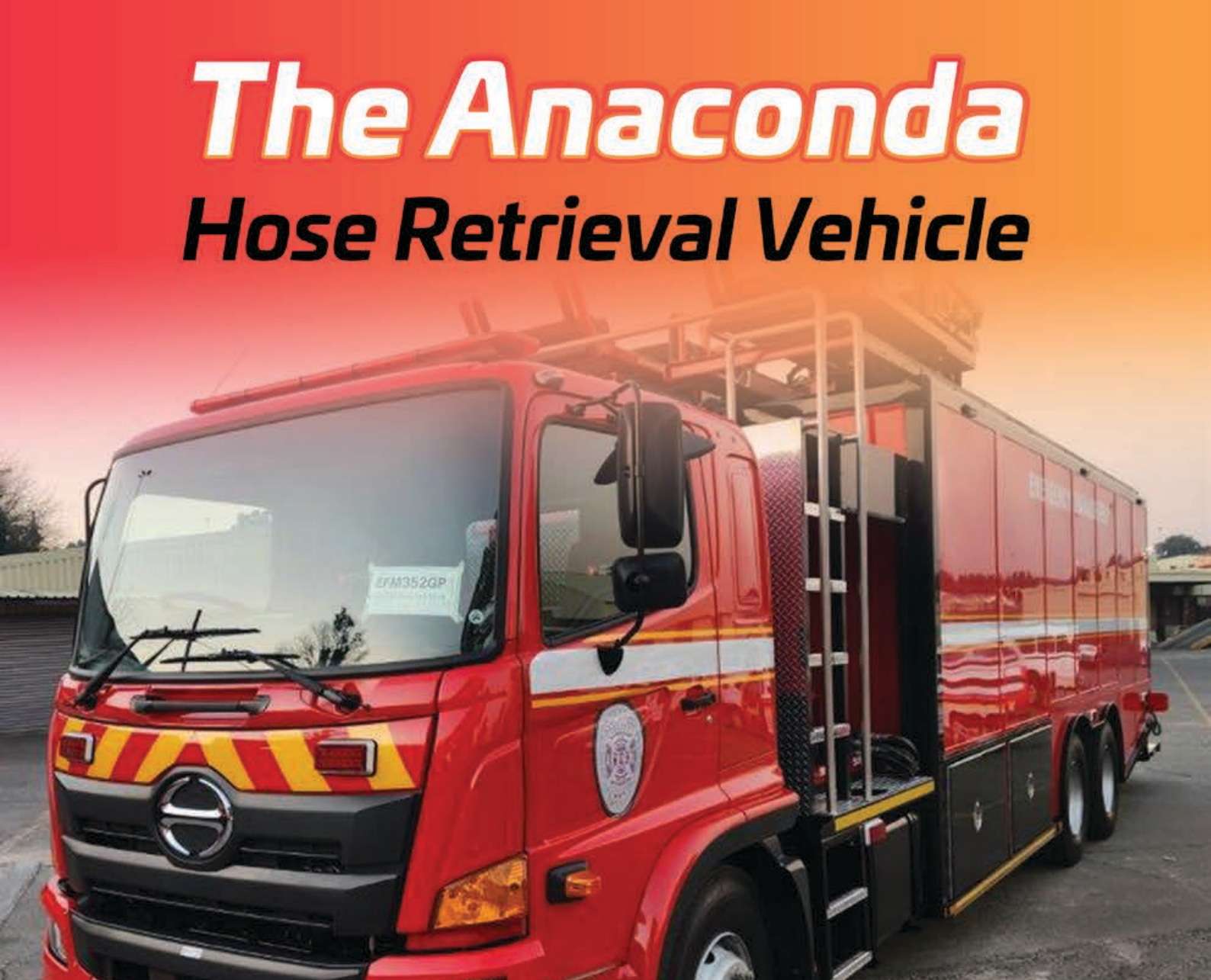
- combustible) (55min/30min).
2. Surface area. Circle area = $3.14x(rxr)$.
3. Application rate fixed system=4.1L/min/m² or portable= 6.5L/min/m².
4. Foam concentrate percentage (3%, 6% or 9%).

References: NFPA11 and NFPA30 ▲



Industrial Fire and Hazard Control introduces the Anaconda hose retrieval vehicle

The Anaconda Hose Retrieval Vehicle



Industrial Fire and Hazard Control recently launched the latest in its product range, Anaconda Hose Retrieval Vehicle.

Industrial hydrocarbon fires, particularly heavy crude at depth, requires substantial water supply with high water/foam solution application rates to extinguish these fires.

In consideration of the fire fighting requirements for tank fires, the world market has moved to the usage of 304mm supply lines (12") and then to have these in longer lengths than those used by municipal departments, primarily in 100m lengths.

This results in a hose lay that, when dry, weighs in excess of 400kg, a weight that is nearly impossible to be manhandled.

Industrial Fire and Hazard Control was challenged by a client to design and develop a hose carrier that would allow the client to not only stow up to 3km of large volume hoses ie 304mm x 100m lengths but also allow these hoses to be laid out without any manhandling and then, at the end of the fire fighting activities, to be retrieved, again without any manhandling.

"Being true to our adage of 'The home of imagineering', Industrial Fire and Hazard Control proceeded to design, engineer and manufacture the Anaconda", said Zarto Williams, Industrial Fire and Hazard Control's petroleum oil and gas (POG) specialist.

The unit is fitted with a dual hose mule hose retrieval system that is hydraulically driven and remotely controlled with a belly box. The dual

hose mule system allows hose to be retrieved from either the right or the left side of the vehicle whilst the vehicle is in motion. The hose mule automatically flakes the hose front-to-rear in the hose bed. The hose beds are separated by a central hose bed divider that extends to the height of the superstructure.

The rear enclosure is fitted with an electrically powered tail lift. The tail lift can be adjusted for height, which allows the laying of the hose whilst the vehicle is mobile without any damage to the couplings connecting with the hard surface. The height adjustable tail lift also allows a fire fighter to guide the hoses at the rear on a return flake.

"The hose beds are capable of stowing more than 3km of 304mm hoses. The development of the



An automated large volume hose retrieval vehicle for retrieving hoses from 6" to 12"



The hose beds are capable of stowing more than 3km of 304mm hoses



The unit is fitted with a dual Hose Mule System that automatically retrieves and flakes hoses

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Anaconda has given us insight into the importance of the municipal market giving consideration to a large volume hose carrier for smaller diameter hoses (100mm/150mm) that can assist at an incident that requires extensive lengths of hoses to be laid and retrieved in a short space of time. Indeed,

the Anaconda concept is not only reserved for the industrial fire departments but is an ideal support vehicle, in varied configurations, for every fire department", said Williams. Whether the application is industrial or municipal, the days of fire fighters manhandling hoses, both

in laying and retrieving, are coming to an end with the introduction of the Anaconda Automated Hose Retrieval System. Why risk injury, unnecessary time lapse or exhaustion when Industrial Fire and Hazard Control can engineer and manufacture an Anaconda to suit your specific requirements. ▲



Introducing Large Atmospheric Storage Tank Fires (LASTFire)

The Large Atmospheric Storage Tank Fires (LASTFire) group has become the leading international forum related to developing best practice guidance on all aspects of storage tank fire hazard management.

LASTFire is a consortium of 16 international oil and storage companies who review the risks associated with fires in storage tanks. The team develop best industry practices to mitigate the risks based on extensive research, academic studies and experience.

The LASTFire project was launched in the late 1990s to review the risks associated with large diameter (greater than 40m) open top floating roof storage tanks. The project was initiated due to the oil and petrochemical industries recognition that the fire hazards associated with large diameter, open top floating roof tanks were insufficiently understood to be able to develop fully justified site-specific fire response and risk reduction policies.



A true fire hazard management (FHM) approach to reducing the fire associated risk to as low as is reasonably practicable, was adopted during the project. This is in line with current regulatory trends towards preparation of 'safety cases' whereby

all aspects of risk mitigation including incident prevention are reviewed.

LASTFire was founded by international industry expert, Niall Ramsden, who has 40-plus years of experience working with fire fighting foam. More specifically he has:

- Worked with foam manufacturers in technical, engineering and research roles
- Been an Independent consultant since 1990, working in more than 90 countries
- NFPA 11 Foam Systems committee member for more than 30 years
- EN13565 Part 2 Foam Systems committee member
- Etank fire Project involvement: reviewing foam application to water soluble fuels
- Energy Institute Process Safety committee member
- Extensive experience of running fire performance tests and demonstrations.
- LASTFire coordinator: leading research in testing in fluorine free foam





- Adviser at Buncefield Terminal multi tank fire event

Under the direction of a project coordinator, a working group including Shell and BP Research personnel worked closely with the project sponsors to investigate these risks and to disseminate the findings of the review in the form of a comprehensive 300 page document including:

- incident frequency survey
- review of incident escalation mechanisms
- risk reduction options
- review of foam properties
- risk workbook
- lightning issues review
- foam performance test for storage tank fires

The LASTFire Project provided an independent and comprehensive assessment of fire related risk in large, open top floating roof storage tanks resulting in a methodology by which site specific fire hazard management policies can be developed and implemented. It therefore represents a major advance in the knowledge of this risk.

Recent follow up work has included the development of the LASTFire Risk Workbook into a fully computerised analysis tool,

the delivery of a Storage Tank Fire fighting Workshop for RPI's clients worldwide and the development of a foam performance test exclusively for storage tank application.

What are the LASTFire deliverables?

- An Incident Database establishing, in a rigorous way, incident frequency statistics related to fires in open top floating roof storage tanks. This has been updated at regular intervals since the initial study.
- A Risk Reduction Options (RRO) document, which discusses the various options available to an operator to reduce risk through both prevention and mitigation based not only on manufacturers data but also feedback from field experience of members. Again, this has been updated on a regular basis to include new technologies and operational experience.
- A Risk Workbook that allows an operator to develop site specific risk based FHM policies.
- A Test Protocol for the evaluation of a fire fighting foam and its performance related to the specific requirements of a storage tank fire
- Test reports on the evaluation of fluorine free fire fighting foams, including small and large scale testing and testing on different

fuels including crude oil.

- Training material and practical workshops developed by fire fighters for fire fighters, describing the strategies and tactics for responding to tank fires.

LASTFire develops best practice guidance based on testing and field experience. Typical subjects have included:

- Linear heat detection systems
- Boilover issues
- Foam position paper
- Internal floating roofs
- Foam assurance
- Test witnessing

As recognised experts in the field of storage tank fire hazard management, the LASTFire Group, on an independent expert basis, witness performance-based testing of systems and innovations.

Typical research work

Previous concentration has been a focus on boilover studies with an aim to providing responders with better information on time to boilover, boilover consequences and fire fighting foam application strategies.

Two member companies have shared theoretical models with the rest of the Group and the experimental data is being used for validation purposes.

New research proposals include research into improved protection methods for internal floating roof tanks and vapour measurements under geodesic domes. Research is also proposed to study bund fires, including understanding foam travel rates, foam application rates and a comparison of foams.

“Over recent years, we have carried out a number of significant research projects thanks to group funding through the membership fee. The results have had a significant impact on our understanding of critical issues such as boilovers, vapour suppression, foam performance testing and of course the transition to fluorine free fire fighting foams”, said Ramsden.

Member companies can benefit from:

- Membership of and influence within an internationally recognised industry body specifically related to storage tank fires
- Networking with fellow professionals
- Immediate access to latest incident databases, risk reduction practices and guidance notes
- Access and influence on practical research work
- Benchmarking with other relevant organisations
- Knowledge sharing in the form of webinars, seminars and workshops.

Representatives from each operating member company make up a steering panel. At regular meetings the Panel make decisions on research topics and conduct reviews of deliverable updates. These decisions and reviews are then put into practice and distributed to the rest of the members.

Suppliers are not allowed to join the steering panel and so there is no commercial influence whatsoever on the decisions made.

LASTFire has established itself as the recognised international industry forum related to storage tank fires. It now continues on an ongoing basis with updates



of deliverables, dissemination of knowledge and development of best practice guidance based on risk-based understanding.

The Group is keen to expand membership and so widen the networking and research aspects to advance storage tank fire hazard management knowledge.

If you need any further information on the work of the Group or the membership structure, please contact the project coordinator on info@lastfire.org.

Further articles will be featured in Fire and Rescue International magazine, with some exciting footage of testing! ▲

Fire and gas systems: Effectiveness and functional safety

By Valeriano Barrilà, managing director, SA Fire Protection Srl



After the major accidents occurred in the oil and power industry in the last ten years, the technical community involved in the design of industrial processes has shown an increased and more intense interest in system reliability and availability.

The attention is no longer limited to the core process but is also extending its boundaries to all those safety systems to which the monitoring and the mitigation effects are demanded.

If it is paramount that a process shall be designed with high reliability criteria, sometimes it is not fully understood that the process reliability cannot rule out the risk of an accident taking place. Engineering limitations also apply to a stressed safety oriented design approach and therefore, one way or another, systems are finalised and built accepting a certain level of residual risk.

If the risk of an accident cannot be lowered below a certain point, we should focus our attention on those systems designed to monitor

the environment and provide mitigation effects. Those process sub-systems, such as fire and gas, deluge, monitors and gaseous based fire extinguishing systems, play a fundamental role in the safety of the plant and its occupants.

These systems are called into action when the residual risk of the hazard turns into an accident of major consequence and their duty is to warn the occupants and the operators and mitigate the accident effects to the best of their capabilities. In this respect, it is well known that a gas cloud detected and confined in time or a fire outbreak detected and extinguished by a deluge water spray system have the same objectives: saving lives, limiting the impact on the environment, reducing the production losses and safeguarding investments.

For the reasons above, functional safety is moving into fire and gas detection and suppression systems, with the objective of increasing the reliability and hence the performance of the safety functions used to monitor and mitigate the effects of a possible accident.

IEC 61508 and IEC 61511

Safety is the acceptable reduction of an unacceptable risk of physical injury to people or damage to the properties. Functional Safety is part of the overall safety that depends on a safety-related system operating correctly in response to its input. The significant hazards for the system have to be identified via a hazard analysis. If the hazard analysis shows that functional safety is necessary, appropriate systems are required to perform specific safety functions to reduce the risk. These systems are called safety-related systems or safety instrumented systems (SIS). Two types of requirements are necessary to achieve functional safety:

Safety function requirements: the scope of the safety function, derived from the hazard analysis.
 Safety integrity requirements: the probability that the safety function will be performed satisfactorily, derived from the risk assessment.

The Standard IEC 61508 'Functional safety of electrical/electronic/programmable electronic (E/E/PE) safety-related systems'

covers the safety lifecycle of the product, from the initial concept through hazard analysis and risk assessment, development of safety requirements, specification, design and implementation, operation and maintenance. IEC 61508 contains requirements for preventing failures and controlling failures, ensuring safety even when faults are present. It specifies the techniques and measures to achieve the required Safety Integrity.

The Standard IEC 61511 'Functional safety - safety instrumented systems for the process industry sector' covers the safety lifecycle of the installation and contains the requirement for the correct selection of safety related equipment and the erection of safety instrumented systems. IEC 61508 specifies alternative techniques to determine the safety integrity of the installation.

The safety integrity is the probability that the safety instrumented systems will perform the required safety functions satisfactorily. IEC 61508 specifies four levels of safety performance for a safety function, called safety integrity level (SIL): SIL1 is the lowest level and SIL4 the highest level.

Each safety integrity level is correlated with an increased risk reduction factor (RRF).

IEC 61508 details the requirements necessary to achieve each safety integrity level.

TABLE 1. IEC 61508 REQUIREMENTS TO ACHIEVE EACH SAFETY INTEGRITY LEVEL

Safety integrity level (SIL)	Average probability of failure on demand (PFDavg)	Risk reduction factor (RRF)
4	≥ 10 ⁻⁵ to < 10 ⁻⁴	10.000...100.000
3	≥ 10 ⁻⁴ to < 10 ⁻³	1000...10.000
2	≥ 10 ⁻³ to < 10 ⁻²	100...1000
1	≥ 10 ⁻² to < 10 ⁻¹	10...100
0	Basic Process Control Systems (BPCS)	

The table provides the target failure measures for a safety function allocated to a SIS operating in low demand mode. Low demand mode means that the frequency of demands for operation of the SIS is not greater than once per year and not greater than twice the proof-test frequency.

Fire and gas systems

The tasks of a F&G system are to detect any hazardous fire or gas condition, to alert the personnel in the area and to activate the control and mitigation systems.

The F&G system effectiveness is the product of the following three factors:

- Detection coverage: the fraction of the monitored area in which an eventual fire or gas hazardous condition would be detected.

- Mitigation effectiveness: the probability that the activation of the final elements would reduce the consequences of a defined hazard.
- F&G safety availability (SA): it is connected to the probability of failure on demand (PFDavg) by the following equation: 1-PFDavg. The PFDavg measures the safety integrity level (SIL) of the system.

The safety availability of a F&G system can be evaluated through a fault tree analysis (FTA) based on the PFDavg of each component. The main components of a F&G system are the following:

- Fire, gas or heat detectors
- Logic solver
- Final elements (deluge system, shut down system, etc)



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► **SIL suitable final elements**

So far the manufacturers' efforts to meet the functional safety criteria for F&G systems have focused mainly on electric and electronic devices, providing components suitable for increasing SIL level systems according to the desired level of functional safety.

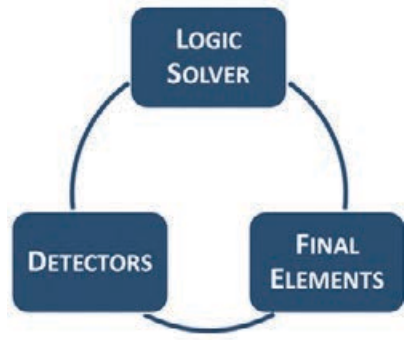
However, the F&G system effectiveness is related to the safety availability of all its components: the overall performance of the system is affected by the weakest element of the chain of its components.

This is the reason that has led SA Fire Protection to focus its attention on the final elements, developing the following SIL suitable solutions according to IEC 61508 for the main types of fire protection systems ie deluge water spray systems, monitors and gaseous based systems):

- The double chamber deluge valves model VDD, suitable for SIL3 systems
- The double-coil electric actuators for gaseous based systems, suitable for SIL2 systems
- The electric monitors Niagara series, suitable for SIL2 systems

Double chamber deluge valves model VDD

The deluge valve Model VDD is an innovative concept valve designed



for fire protection systems according to NFPA 15, UL 260 and IEC 61508/61511. The VDD deluge valve combines all the functions available on the traditional deluge valves with a fully redundant architecture, designed to achieve higher reliability.

In fact, the VDD deluge valve has two priming chambers, each one provided with its own diaphragm and actuation trim, which offer two independent waterways to the water spray system. Each priming chamber provides the nominal design waterway for the fire protection system: in case of failure of one diaphragm, the opening of the other diaphragm allows the hydraulic waterway for the correct operation of the water spray system.

In practice this new concept translates into a built-in emergency bypass line that operates on both priming chambers in hot back-up.

Moreover, a hydraulic bridge between the trims allows each trim to control both the diaphragms, releasing the water trapped in the two priming chambers.

If one trim should fail, the other trim can open both the priming chambers through the hydraulic bridge. Thus the double chamber deluge valve can overcome a double failure trim plus priming chamber.

Advantages

The advantage of using the VDD deluge valves can be measured in terms of increased reliability, lower response time and easier system operations.

1. Increased deluge system reliability and availability on demand (SIL 3 validated by third party)
2. Response time to failure reduced to zero
3. Continuous fire protection (no downtime for service or even repairs)
4. Deluge skid dimension and weight can be reduced accounting on the built-in by-pass in hot back-up

Application

Model VDD deluge valve is specifically designed for industrial harsh environments such as oil and gas onshore and offshore, chemical, conventional or nuclear power, military and those which require:

1. A low probability of failure on demand
2. A safety instrumented system with a deluge system as final element capable of being integrated into SIL 3 systems
3. Continuity of fire protection during maintenance or repair
4. Reduction of weight, dimensions and cost of the skid.

Typical application includes fire suppression or cooling of critical process equipment, toxic vapour mitigation and confinement.

Double-coil electric actuators

Gaseous based fire extinguishing systems include carbon dioxide, inert gases and halocarbons. All of them are kept pressurised into cylinders or containers ready to be discharged to the protected area. On a similar principle, water mist systems are

made of a series of water cylinders propelled by a nitrogen reserve contained in a pilot cylinder. Normally these systems are composed of a series of sensors, a logic controller and a final element, which is often represented by a pilot cylinder.

When such systems are called for duty a missed activation of the pilot cylinder can lead to an unacceptable consequential scenario. SA pilot actuators have been developed for sensibly reducing the probability of such failures, increasing the Safety Availability of the fire extinguishing system. They have been validated by BV as suitable for safety instrumented systems with an expected SIL2 level. When used in combination to form external activation packages the actuator can contribute to form architectures that can be qualified to SIL 3.

Advantages

The redundancy of the double-coil electric actuator increases the reliability of the overall pilot cylinder. The actuator has two coils which receive two independent signals from the logic controller (F&G). If one coil fails, the other coil is able to open the cylinder valve. On the same principle these redundancy increase the overall system availability as the loss of one cable or the failure of the F&G discharge cards do not compromise the fire suppression system activation.

Such solution has been implemented to cover all those fire hazards, which require an increased reliability for the fire extinguishing system and, therefore, a safety function with an expected SIL2 level.

Applications

The double-coil actuator is designed for those systems which require:

1. A low probability of failure on demand
2. A safety instrumented system with a gaseous based fire protection system as final element, capable of being integrated into SIL2 systems
3. The combination of a high safety integrity level with low dimensions and weight.

The double-coil electric actuator is specifically designed for the protection of gas turbines and their generators, critical IT server farms, electronic rooms governing industrial processes and all general purpose installations on offshore platforms or FPSO, where generally a fire brigade is not easily available to compensate a possible fire-fighting system failure.

Electric monitors Niagara series

The Niagara electric type remote controlled monitors are designed to deliver large amounts of water or water foam solution towards remote targets. They are commonly used to protect petrochemical jetty or within the process areas to cool structures, vessels or fight potential fires of a considerable magnitude.

From the safety availability point of view, the remote controlled monitor architecture comprises of a Logic Controller and one or more final elements (monitor assembly). The logic controller is the heart of the system and distributes the commands to the monitor itself. In such system or at least in the simplest version, the detector is not normally integrated and the system responds directly to human actions.

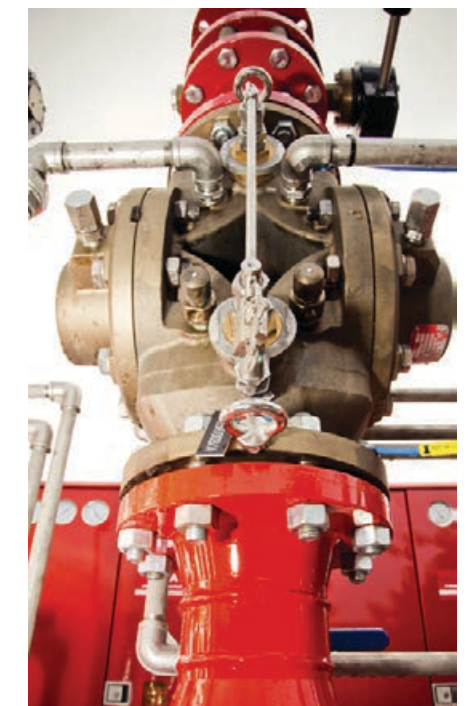
The Niagara monitors have been assessed and validated by BV as suitable for safety instrumented systems with an expected SIL2 level.

The increased reliability performance of the Niagara series monitor is related to its particular design, which allows an automatic self-diagnostic analysis to be performed. At regular intervals the self-diagnostic system implemented in the logic controller checks the correct operation of the monitor actuators on given commands, allowing for constant monitoring of any possible failure of the monitor and the nozzle.

In case of an anomalous condition, a warning signal is sent to the control station.

Advantages

A possible failure of a traditional



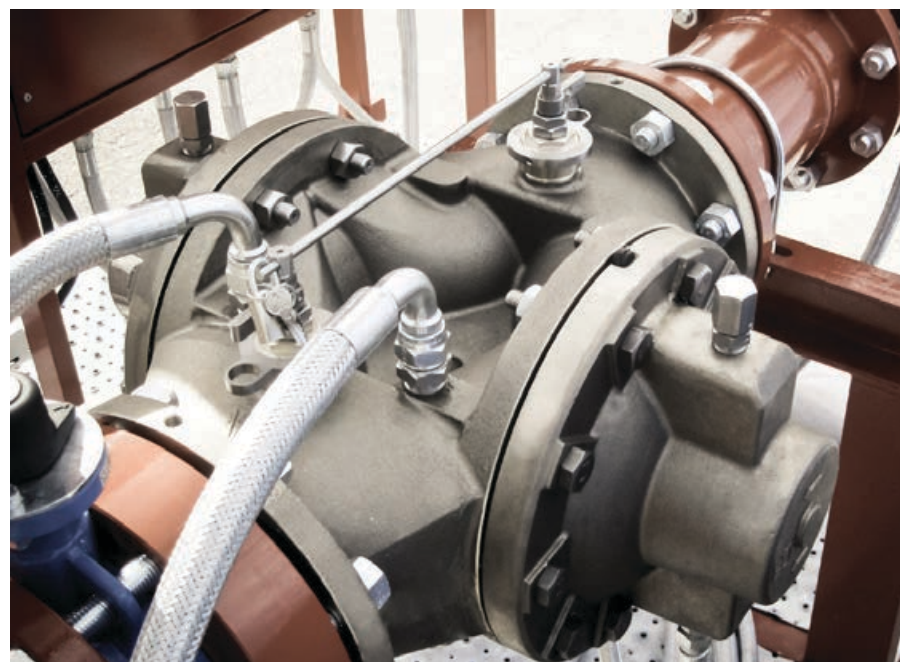
electric remote controlled monitor can be detected only when periodic maintenance and test are performed. The constant monitoring of the system status implemented in the Niagara series monitors, instead, allows a possible failure to be detected and repaired when the fire protection system is in "safe condition", sharply increasing the reliability of the overall fire system on demand. Such improvement reduces the probability that faults, taking places among regular maintenance intervals, will pass undetected.

Detecting a possible fault in a safety system in time, rather than in a fire condition, can make the difference on the emergency operation success.

Application

The Niagara series monitors are specifically designed for petrochemical jetty and marine harbour protection, structure and vessel cooling and those systems which require:

1. A low probability of failure on demand
2. A safety instrumented system with monitors as final elements capable of being integrated into SIL2 systems
3. A large amount of water towards remote targets. ▲



Mutual aid agreements

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

Alexis de Tocqueville might not be a name many of us in this country are familiar with. It might also be strange that this French aristocrat, diplomat, political scientist, political philosopher and historian would appear in an article about fire fighting.

Allow me to explain: De Tocqueville is best known for his works *Democracy in America* (appearing in two volumes, 1835 and 1840) and *The Old Regime and the Revolution* (1856). In both, he analysed the living standards and social conditions of individuals as well as their relationship to the market and state in Western societies. *Democracy in America* was published after Tocqueville's travels in the United States and is today considered an early work of sociology and political science.

When travelling around the United States in the early-1800s de Tocqueville as part of his study of social conditions. He saw as unique the kind of "mutual aid" that existed in civil society. In his classic "Democracy in America" he brought to light the premise that individuals, families, villages and towns working together were the grassroots of a new social order. He saw it manifest in churches, service groups, fire brigades and militias where freedom, safety and welfare were ensured more by small communities than by bureaucrats in distant capitals.

Mutual aid agreements need not be complex documents requiring endless meetings and reams of drafts to complete. I'm sure that it wouldn't take more than a request to a similar size and type fire service would do the trick. You might even find some good examples on Google. There are, however, some important points to consider when

you get to the point of drafting your own Mutual Aid Agreement (MAA).

In this article I will attempt to discuss some of these points and hope that they give you some sort of guidance when you get called upon to embark on such a process. I will also give some background of the MAA system we use here in the Western Cape. Maybe Mr de Tocqueville would have been inspired by this!

What is a Mutual Aid Agreement (MAA)?

Mutual aid is the voluntary sharing of personnel and resources when an agency cannot deploy, sufficiently, its own resources to respond to an unusual occurrence. Resources are then requested by the affected agency through an agreement entered into by services in a common geographic region residing within different jurisdictions. The agreement may be done horizontally ie, different services on the same level or it can be overseen by a different sphere of Government such as the provincial administration.

As I will explain later, MAAs must be focused on specific assistance that may be required by a service, yet it is not the absolute legal route for the provision of assistance in all situations. Should the incident be of such a nature that it warrants the declaration of a disaster, mutual aid can become mandatory and services will be required to act under that legal mandate.

Why do we need MAA?

MAAs are primarily intended to assist (generally smaller) services who are called upon to deal with an incident that exceeds their resource capability. They might require more vehicles, equipment and personnel. They then invoke the MAA and

request the additional resources from a nearby service who is also a signatory to the agreement. This is not the only instance where it can be of value. It might be that a particular service needs a resource that they don't own but that exists in a service included in the agreement eg, aerial platform or foam tender. In this case only the specific unit can be requested.

It might also be that a specialised capability such as a hazmat team or a hi-angle rescue team might be needed. MAAs should also allow for this.

Within any given MAA, allowance should also be made for 'automatic-aid agreements'. This is necessary when remote rural services can be spread so far apart that it's common for an adjacent fire service to arrive first on the scene in its neighbour's jurisdiction. The automatic agreement will then enable the affected service to dispatch the closest resources available, despite the fact that it is in a neighbouring jurisdiction.

Automatic MAAs can also provide great value in the event of a wildland fire incident where early response could mean the difference between getting early control or ending up with a pro-longed and costly incident. The plan would entail services responding to pre-identified high-risk areas at the incipient stage of a wildfire, regardless if it is in their jurisdictional region or not.

The final MAA is that which exists between specialised fire services and Government (municipal) services. A large oil refinery might only have a service with minimum permanent staff and teams of part-time process operators making up the numbers. In the event of a significant incident,

they will be able to call on the surrounding fire services to assist in terms of the MAA.

Normally the spirit of the agreement will not require payment for the assistance provided ie "You help me this time, I'll help you next time"

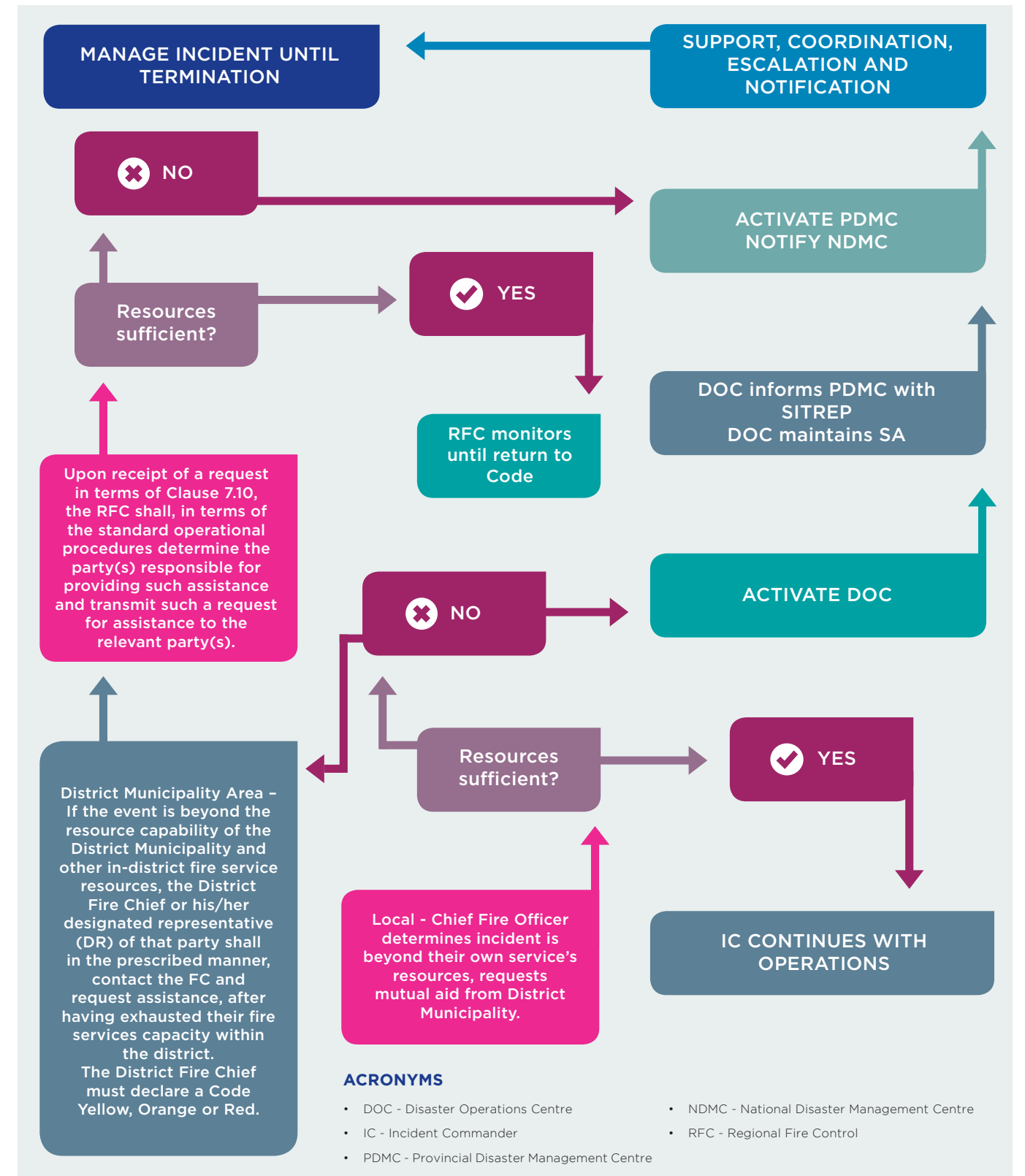
but in the case of a private service, this might not always be possible. Unfortunately, the bean counters are always watching.

Planned and scheduled community events do not meet the criteria for mutual aid and therefore should

include costs if required. Mutual aid may, however, be necessary in extraordinary situations.

The "how to"

So now that we have determined the need for a MAA, we must decide on how it should be coordinated. ▶



► In the Western Cape we do this on three levels:

Local: Chief fire officer determines incident is beyond own service's resources and requests mutual aid from district municipality.

District municipality area: If event is beyond the resource capability of the district municipality and other in-district fire service resources, the district fire chief requests mutual aid through the Western Cape Provincial Mutual Aid agreement. The district fire chief must declare a Code Yellow, Orange or Red. See table.

Province: If the resources within the impacted area are not sufficient, the provincial mutual aid coordinator may activate inter-provincial and national arrangements.

Although our system has been in operation for a number of years and is fairly frequently used, it is reliant on continuous reevaluation and review. The initial drafting of the document must include a stage where it is legally vetted. You will be delivering a service in a different jurisdiction and, most probably, not be charging a cent for it! There are also issues such as legal liability and insurance of equipment that must be addressed.

When drafting the MAA there are a range of points that must be addressed in order to ensure a robust and effective tool for this purpose. They include the following:

- **Definitions of key terms**
To make sure everyone is on the same page. All resources must be "typed" according to their capability and numbers. When a specific resource is called for by the officer on scene, he/she must know that the right resource is coming.
- **Procedures for requesting and providing aid**
The MAA must provide clear guidance on what the procedure shall be for each incident type. It will prevent a measure of "free-lancing" whereby the MAA is

invoked as a convenience. As an example: During the 2010 FIFA Football World Cup Emergency Services and Law Enforcement in the Western Cape adopted the METHANE acronym to build a report for alerting others about a major incident.

METHANE stands for:

- Major incident declared
- Exact location
- Type of incident
- Hazards
- Access
- Number and type of casualties
- Emergency services present and required.

- **Payment, reimbursement and allocation of costs**
Although the spirit of fire service MAAs doesn't specify payment, there will be instances where some form of reimbursement might be necessary. It might be that different municipalities have different revenue collection structures and this could be problematic after the incident. These issues must be clarified beforehand. Clarity must also be provided as to who will be responsible for the collection of funds for services rendered. Will the affected service be billed or will it go to the individual who required the service initially.
- **Notification procedures**
This will include the level of authority that may invoke the agreement as well as at which level the assisting service is authorised.
- **Roles and responsibilities of individual parties**
This will include issues such as the provision of food and accommodation, fuel and incident command.
- **Protocols for interoperable communications**
Communications is key on a major incident. Ideally all services must be able to communicate on the same system. If this is not possible a radio swap system must be implemented. Whichever system

will be implemented, it must be done at the early stages.

- **Relationships to other MAAs**
If you have an agreement with a private service (refinery), will you be able to invoke your MAA with other services to assist you there? Also ensure that the requirements of one agreement don't clash with another.
- **Liability and immunity**
This is important in ensuring that personnel can be legally deployed outside their areas and will be covered in the event of death or injury.
- **Exercises**
Training and exercising together is the best way to ensure effective response in an MAA invocation. At least one exercise should be held annually.
- **Provisions to update and terminate the agreement.**

Roll of the Province
Provincial fire services directorates can play a major role in the drafting, administration and coordination of a fire service MAA. Due to them having a birds-eye view of all the services within its province, it will be able to identify the capacity of the service and how it will be able to contribute to the agreement.

The province will also be best positioned to manage any resources arriving from outside the provincial boundaries. Any existing MAAs the provincial authority has entered into with other provinces can also be activated if necessary.

In closing
In the province I work in I can't recall any major incident outside of the city of Cape Town where our MAA was not activated. MAAs are a powerful tool for any service, especially in an environment where resources are limited and we are necessitated to rely on our neighbouring services. You will require careful planning and build a high level of trust among the participants where each service knows their responsibilities and how they can benefit from it. ▲

Mutual Aid Concept

Mutual aid is the voluntary sharing of personnel and resources when an agency cannot deploy, sufficiently, its own resources to respond to an unusual occurrence. Resources are then requested by the affected agency through the Western Cape Provincial Mutual Aid Agreement. This cooperative system may be executed on a local, district, metropolitan and provincial basis. The Western Cape has been divided into six mutual aid regions to more effectively apply, administer and coordinate mutual aid. Mutual aid can become mandatory following provincial and national disaster declarations. Generally, there is no reimbursement for providing mutual aid.

Authorities

- Municipal Systems Act, 2000 (Act 32 of 2000) section 3 (as amended) and;
- Fire Brigade Services Act 99 of 1987, section 12 and;
- Municipal Structures Act 117 of 1998

Mutual Aid Process

Local - Chief Fire Officer determines incident is beyond own service's resources, and requests mutual aid from District Municipality.
District Municipality Area - If event is beyond the resource capability of the District Municipality and other in-district fire service resources, the District Fire Chief requests Mutual Aid through the Western Cape Provincial Mutual Aid agreement. The District Fire Chief must declare a Code Yellow, Orange or Red.
Province - If the resources within the impacted area are not sufficient, the Provincial Mutual Aid Coordinator may activate inter-provincial and national arrangements.

Activation and Coordination Control Centre

City of Cape Town Fire Control (FC) shall be used as the Activation and Co-ordination Control Centre for the purpose of this agreement, should a District Municipality need assistance. A District Municipality in need of assistance shall contact FC who shall have the right to co-ordinate and control the response if required. When the City of Cape Town requires assistance, it must contact the relevant District Municipality Control Centre, who shall have the right to co-ordinate and control the requested response.

Channels for requesting Mutual Aid

See flow chart.

Mutual Aid Considerations

Disaster declaration not necessary to request and provide mutual aid. Use of National resources require approval by The National Disaster Management Centre (NDMC)/The National Joint Operational and Intelligence Structure (Natjoints)/Joint Terminal Attack Controller (Jtac). National resources are to be used when local resources are committed to maximum. No service is required to unnecessarily deplete their own personnel, equipment and capabilities, in order to provide mutual aid. It is generally accepted that a reasonable response will consist of up to 50% of available resources. The service receiving mutual aid is responsible for the care, feeding and shelter of responding mutual aid resources. Planned and scheduled community events do not meet the criteria for mutual aid and therefore, should include costs if required. Mutual aid may however be necessary in extraordinary situations. Mutual aid reimbursement costs may be applicable under local, provincial or national disaster declarations. Otherwise, all mutual aid costs are the responsibility of individual participating services. Out-of-province mutual aid is coordinated through the PDMC unless as already specified in interprovincial agreements and MOU's. Other state- owned entities can be tasked or requested to assist in providing mutual aid.

SITUATION CODES		
COLOUR	ACTION	ICS INCIDENT TYPING
GREEN - Normal.	Nil	Type 5 Incident: An incident that can be handled with one or two single resources with up to six personnel.
YELLOW - Incident occurs; provide back-up for area of jurisdiction.	Alert the service, which is required to provide back-up. Inform the PDMC. Monitor situation until code "GREEN" is declared. Inform the PDMC.	Type 4 Incident: An incident where several resources are required to mitigate the incident, including a task force or strike team.
ORANGE - Serious incident occurs, provide stand-by in area of jurisdiction, and require relief crews.	Alert the service which is to provide stand-by. Inform the PDMC. Co-ordinate arrangements for relief crews. Monitor situation until code "GREEN" is declared. Inform the PDMC.	Type 3 Incident: An incident which the needs thereof exceed the capabilities of the responding agencies.
RED - Serious incident occurs, require immediate assistance.	Immediately co-ordinate mobilization of assistance required. Inform the PDMC. Monitor situation and co-ordinate back-up for further possible incidents. Monitor the entire situation until code "GREEN" is declared. Inform the PDMC.	Type 2 Incident: An incident that extends beyond the capabilities for local control and is expected to go into multiple operational periods. A Type 2 incident may require the response of resources out of area, including regional and/or national resources, to effectively manage the operations, command, and general staffing. Type 1 Incident: A complex incident, requiring national resources for safe and effective management and operation.

NOTES ON CODE RED

- (a) The Chief Fire Officer of the party requiring assistance shall, if necessary, inform his Chief of Disaster Management of the situation.
- (b) A code "RED" situation may require formal Disaster Management action but immediate action under the agreement will, in any case, be initiated in order to speed up a return to a code "GREEN".

Reporting and Alerting Other Emergency Services

During the 2010 FIFA SWC Emergency services and Law Enforcement in the Western Cape adopted the **METHANE** acronym to build a report for alerting others about a major incident.
METHANE stands for:
Major Incident Declared
Exact location
Type of incident
Hazards
Access
Number and type of casualties
Emergency services present and required
METHANE is now the recognized model for passing incident information between services and their control rooms. All services have used similar models for passing information in the past, but **METHANE** has instigated the use of a common model that means information is shared between emergency service providers in a quick, easy and consistent manner.



AI can accurately predict potentially fatal cardiac events in fire fighters



In this 2013 photo, nurse scientists Becki Vincent and Mary Carey from the University of Rochester collect electrocardiogram data from a fire fighter at the Dewey Avenue Firehouse in Rochester, New York. Now, a decade later, researchers at NIST, Rochester and Google have used this data to train an AI model to predict cardiac events. Credit: Karen O'Hern/University of Rochester School of Nursing

Fire fighters regularly risk their lives in dangerous situations but most deaths on duty are not directly caused by fire or smoke inhalation. Instead, approximately 40 percent of on-duty fatalities come from sudden cardiac death.

Now, researchers at the US National Institute of Standards and Technology (NIST) and their colleagues have used a form of artificial intelligence (AI) known as machine learning to accurately identify abnormal cardiac rhythms in fire fighters. The researchers hope their work will eventually lead to a portable heart monitor that

fire fighters could wear to catch early warning signs of heart trouble and prompt them to seek medical attention before it's too late.

The team, which includes researchers from NIST, the University of Rochester and Google, published its results in the *Fire Safety Journal*.

Sudden cardiac death claimed the lives of 36 fire fighters on duty in 2022, according to the National Fire Protection Association.

Sudden cardiac death occurs when an irregular heart rhythm causes the

heart to stop pumping blood, most commonly due to a heart attack. Sudden cardiac events kill on-duty fire fighters at twice the rate of police officers and four times the rate of other emergency responders.

"Year after year, sudden cardiac events are by far the number one killer of fire fighters," said NIST researcher Chris Brown. "Cardiac events also cause career-ending injuries and long-term disabilities."

Fire fighters work in remarkably strenuous environments, carrying heavy objects, climbing stairs and enduring extreme temperatures with

a limited ability to cool off. And while they may experience significant discomfort, reports have shown that fire fighters often try to push through these situations without realizing they may be at risk for sudden cardiac death.

To address this issue, the NIST researchers got in touch with colleagues from the University of Rochester School of Nursing. A decade ago, Rochester researcher Mary Carey and her colleagues collected 24 hours of electrocardiogram (ECG) data from each of 112 fire fighters, who had electrodes strapped to their chests. The ECG data encompassed 16-hour on-duty shifts and eight-hour off-duty shifts during which the fire fighters engaged in their daily activities such as answering fire and medical calls, exercising, eating, resting and sleeping.

"The fire fighter data we collected is so unique," said Rochester co-author Dillon Dzikowicz. "Having robust data is essential to move our work forward and protect fire fighters."

The researchers then used machine learning and the Rochester dataset to build what they call the Heart Health Monitoring (H2M) model. They trained H2M with 12-second segments of a large portion of the ECG data. Individual heartbeats in the ECGs were classified as normal beats or abnormal beats indicative of irregular heart rhythms such as an atrial fibrillation or ventricular tachycardia.

"The model is designed to effectively learn ECG patterns from both normal and abnormal beats," said NIST guest researcher Jiajia Li.

Once H2M was trained and validated, it analysed fire fighter ECG data from the Rochester dataset that it had not previously seen. When presented with approximately 6 000 abnormal ECG samples, H2M identified them correctly with about 97 percent accuracy. As a check, H2M was also trained using ECG datasets from non-fire fighters. When it used this non-fire fighter data, H2M had an error rate of about

40 percent in identifying cardiac events in the fire fighter data.

"Using the right dataset to train the AI model was critical," said NIST researcher Wai Cheong Tam.

In the future, the researchers envision that this model could be incorporated into portable heart monitors that fire fighters could wear on duty to warn them of cardiac irregularities in real time. Such an AI assistant could be the next best thing to a cardiologist accompanying a crew fighting a fire.

"This technology can save lives," said Tam, adding that this approach could be broadened to help other groups if the AI is trained with appropriate ECG datasets. "It could benefit not only fire fighters but other first responders and additional populations in the general public."

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Photos with special permission from University of Rochester.



A group of career fire fighters from Rescue Company No 1 in Buffalo, New York, after a fire call. These fire fighters wore electrodes to measure electrocardiogram data (ECG) over a 24-hour period. Credit: Mary Carey, University of Rochester School of Nursing



A nurse scientist applies a 12-lead electrode to measure a career fire fighter's electrocardiogram during a physical test. Credit: Mary Carey, University of Rochester Nursing School



Helitack for the Western Cape, South Africa

At the request of the Western Cape Disaster Management and Fire/Rescue Services, two private companies have come together to improve the effectiveness of the Western Capes Provincial government's proactive approach to the management of wildfires, which occur in many parts of the province.

This proactive approach to managing wildfires ie veld, forest and mountain fires, includes the rapid deployment of resources, aerial and ground, to such wildfires, whilst in their incipient stages. It comprises of a rapid initial attack with the primary objective of preventing and reducing a mega wildfire.

NCC Environmental Services has a three-year contract with the Western Cape Government to provide Type 1 ground crews to respond to wildfires on behalf of the various municipalities and organisations in the Western Cape. At the same time the Western Cape Government has contracted Kishugu Aviation, who in turn is sub-contracting Leading Edge Aviation, South Africa, who own, operate and crew a Black Hawk helicopter, to aid with rapid response to wildfires. Leading Edge Aviation, via a term contract with Kishugu Aviation, provides a Sikorsky UH-60 Black Hawk helicopter, to aid with the rapid response to wildfires. This is the only Black Hawk of its kind in South Africa that provides wildfire services.

NCC and Leading Edge Aviation have come together to ensure that resources are deployed to the fireline more efficiently. Without ground crews the effectiveness of a helicopter's fire fighting effort is greatly reduced. Likewise, not having water to assist ground crews working in remote areas, makes containment much harder and at times, more dangerous.



Putting these two resources together makes a highly efficient and effective fire fighting resource.

NCC's Type 1 ground crews have been trained by Leading Edge Aviation and received their certification. They now have the capability to respond together as an initial attack for wildfires throughout the Western Cape. This enables ground crews to get to the fireline faster, be inserted into generally inaccessible areas and importantly, obtain an overhead situational awareness of the fire behaviour on arrival.

This is another first for the Western Cape Government, NCC Environmental Services and Leading Edge Aviation. ▶





Command Corner: Fire not scouted and sized up!

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

Watch out situation #1: Fire is not scouted and sized. Before taking action on the fire, the following considerations must be addressed:

- Can you personally observe the fire or must you use scouts? Describe ways you can scout and size up.
- Do you know the location of the fire perimeter? Discuss situations in which the fire perimeter may not be obvious ie spotty fires, etc.
- Do you know the direction of fire spread? When isn't the direction of fire spread obvious? (Wind shifts, spotty fires, etc.)
- Does the direction of fire spread increase risk? Talk about situations where you may have to approach the head of the fire. (Hiking down from a helispot, approaching from an existing road, switching winds, etc.)
- Do you know the fuels and their condition? What kind of information will you assume from what you already know about fuel types? (Spot fires, extreme fire potential in flashy fuels, etc.)
- Are there aerial resources that can act as lookouts?
- Do topographic hazards exist? What can you assume from what kind of terrain the fire covers? (Slope, chimneys, aspect, etc.)
- Does enough information exist to establish a plan of attack? When do you have enough information to begin fighting fire? What do you need to know?
- Do other dangers exist? Have you talked about factors specific to the area you are working in? (People in the forest, drought, snag patches, etc.).

- To reduce the risks: post lookouts until the fire is sized up and escape routes and safety zones are established.
- Retreat if the situation is too complex. Review fires where you had to wait until the area in which you were assigned to work was scouted and sized up before you were allow on to the fireline.

Reference Inside Cover of Incident Response and Fireline Safety Pocket Guide for Size up Reminders.



Chief Tim Murphy



South African winter fire season update: Fire fighters from the Working on Fire-Kishugu Joint Venture in full swing

With the Winter Fire Season in full swing, the Working on Fire-Kishugu Joint Venture has been tirelessly battling wildfires across all provinces where they operate. Their efforts have been critical in suppressing fires, thus saving lives and protecting the environment.

As of 17 July 2023, Working on Fire teams has been actively collaborating with partners, landowners, and stakeholders, assisting in the suppression of a total of 491 fires, since June 2023, the traditional start of the South African winter wildfire season.

In the month of June 2023, Kishugu Aviation aircraft provided aerial fire support at 20 fires and made 184 water drops with its helicopters and fixed wing water bombers.

Among the provinces, Mpumalanga was the busiest, recording a total of 58 fires, followed closely by Limpopo with 57 fires and KwaZulu-Natal with 52. Free State accounted for 43 fires, while the Eastern Cape dealt with 40 incidents. Gauteng assisted in 36 fires and the North West recorded 30. Notably, the Western Cape did not report any fires during this period as they were out of their fire season, which is the Summer Fire Season. Nevertheless, their teams remain vigilant and prepared to offer assistance in case of any wildfire emergencies.

The Working on Fire Programme's dedication to Integrated Fire Management Services (IFMS) has been an essential aspect of their approach. Besides fire fighting, their focus on fire prevention, early detection and fire awareness education is instrumental in reducing the occurrence of wildfires and educating communities on fire safety measures.

The Working on Fire Programme is an Expanded Public Works Programme funded by the Department of Forestry, Fisheries and the Environment. It is implemented by the WoF-Kishugu Joint Venture and the Programme will be celebrating another milestone of being in existence for 20 years in September 2023. ▲



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Appointment of a new Fire Lecturer at the Nelson Mandela University



Nelson Mandela University, George Campus



New Fire Ecology and Conservation Lecturer, Samukelisiwe Msweli

She has been appointed through the New Generation of Academics programme (nGAP), a Department of Higher Education initiative, to facilitate effective teaching and learning in the Veldfire Management field. The nGAP recruits highly capable scholars as new academics and supports research and teaching development.

Msweli studied at Nelson Mandela University since 2014 enrolled for a National Diploma in Nature Conservation and in 2020 graduated with a Master's Degree. Her dissertation on the flammability of native and invasive alien shrubs in the southern Cape was presented in the National Symposium of Biological Invasions, Thicket Forum, shared on SABC news and published two scientific articles.

Her research interests include fire ecology and understanding how the effects of climate change influence plant flammability. Msweli intends to obtain a PhD

and, in the future integrate plant flammability knowledge into wildfire management approaches suited for communities bordering flammable natural vegetation.

Prior to joining Nelson Mandela University, she worked for the South African National Biodiversity Institute (SANBI) where she was involved in vegetation mapping and contributed to the improvements of the National Vegetation Map, which were presented at the Arid Zone Ecology Forum and 18th National Biodiversity Planning Forum.

Her participation in the Intercultural Communication and Competencies course in Namibia by SPACES II and Environmental and Remote Sensing data analysis via Geospatial Technologies in Research Training from Goethe University have set a foundation for a determined young teacher and a researcher. Sam values education and aspires to be an example to upcoming academics. ▲



The Garden Route in flames: Chapter VIII - Using photoseries for prescribed burning and wildfire assessment

A book by Dr Neels de Ronde

The following article is the eight chapter in the series of excerpts from a book written by Dr Neels de Ronde, The Garden Route in flames. Dr De Ronde lived in the Southern Cape in South Africa and had done extensive research in the field of land management and wildfire prevention. Dr De Ronde gave permission to Fire and Rescue International to publish his 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.

Using photoseries for prescribed burning and wildfire assessment

Regional photoseries should be developed from each representative fuel model included in a regional-specific custom fuel model set developed for a region. Custom fuel model sets should preferably have a total number of 8 – 15 representative regional fuel models, which should form the bases for all purposes as set out in pars. 2.1 to 2.5. Individual fuel



Photograph 28: Mature Arbustos shrubland in northern Portugal (unknown photographer)

models will then be developed and tested with the BehavePlus 2-D fire behaviour prediction program (Andrews, 1986 and other).

A typical example of a multiple fuel model in a fuel model set can be illustrated as is shown on the next page below. Note first of all the basic Photograph with measuring stick to provide fuel depth perspectives. Also note that there are four boxes in which specific information has been provided, namely: (i) overstorey characteristics, (ii) fuel loading (tons/ha), (iii) understorey/

fuel characteristics and average percentage cover, and (iv) fire behaviour under specific prescribed burning conditions.

The examples on the next pages are one Photograph of the vegetation illustration with a measuring stick, here shown is Tsitsikamma Fynbos, similar to what should be developed with photoseries for the mountains in the Outeniqua Mountains, Arbustos shrubland in Portugal (Photograph 28) and an example of a full photoseries picture has been provided under Photograph 29. ▲



Photograph 29: Example of Photoseries with vegetation, fuel and fire behaviour characteristics with output for prescribed burning and wildfire conditions, courtesy York Timbers (Pty) Ltd

Toughest Firefighter Alive (TFA-SA) 2023 5 to 7 October 2023

There are approximately four weeks left before the eighth running of the official 'Toughest Firefighter Alive South Africa (TFA-SA)' Open challenge, which will be held in Mossel Bay from 5 to 7 October 2023.

A total of 150 fire fighters have registered for the event to date with the closing date for registration moved to 15 September 2023.

This year's competition promises to be more competitive due to the better being better prepared for the event. Individual, team, relay, best newcomers are the categories that the entrants will be vying for. All participants are encouraged to register before the deadline to avoid missing out on South Africa's premier Firefighter competition!

Description of the stations, rules and regulations

Self-contained breathing apparatus (SCBA) will be used off air with the cylinders closed minus face masks, for the circuit. The competition will consist of four stages, with each stage being timed separately for each competitor. The total time will consist of the combined times of all four stages with the lowest combined times being the winner.

Competition gear: Fire-approved fire helmet, fire tunic, fire boots and fire fighting gloves. SCBA to be supplied by the organisers.

Stage 1: Hose advance and make-up

Dress: Fire helmet, fire tunic, fire boots, fire fighting gloves and SCBA set donned, off air. The contestant starts by proceeding to pick up the nozzle end of two lines consisting of 3x 30m x 65mm uncharged lengths each and extend the two lines over a distance of 75-80m to a designated area and place both branches over

the demarcated line. The contestant then proceeds to run 10-20 metres to make up 2x 25m lengths of hose. The two length hoses will then be made up, each in a single roll and placed fully in the box provided with no portion of the hose hanging out. 10 second penalty will be incurred per hose not placed fully in box.

Stage 2: Obstacle course

Dress: Fire helmet, fire tunic, fire boots and fire fighting gloves, SCBA set donned, off air. Run 10m from start line to hammer at the Keiser Force machine, pick up hammer and hit the block (+/- 72,5kg) horizontally over a distance of 1,5m to the finish mark. Put down hammer in demarcated area. Run towards the start of dummy (+/- 80kg) and drag the dummy backwards for 70m turning at 30/40m to and around the marker cone, returning and dragging the dummy back over its original position. Run 20m and pick up 2x 20kg containers and run 10m with the containers to a 10-20m tunnel and go through it, then run around marker cone 10m away and come back through tunnel and return container to its original position 10m away. The breathing apparatus backpack and cylinder is to be removed and placed on a platform. The contestant will then run to the three-metre high wall and climb over the top, using the rope provided, if needed. Once on top of the wall, the contestant will drop from the top of wall onto the crash mat. The time will be stopped after jumping from the wall into the mat.

Stage 3: High rise pack carry and hose hoist

Dress: Fire helmet, fire tunic, fire boots and fire fighting gloves, harness and SCBA set donned, off air. Run 10m and carry a ladder to a designated area and pitch it, repeating this with the second ladder. Run to the marker/cone pick up the 1x 20kg)

foam container and climb the tower, using the stairs until you reach the top. The contestant is allowed to ascend by two or more steps at a time. Place the foam containers in the designed area. Attached sling to the harness and using the rope, haul up the two hoses (20-25kg) over the top railing of the tower and place them on to the landing in the designated area. Pick up and carry the foam containers downwards, descending one step at a time down, to the ground floor and place down the containers in the designed area. Run 10m to the ground monitor and attach the nozzle. Run 10m and cross the finish line.

Station 4

The final station will comprise of a beach run approximately 600m in the vicinity of De Bakke.

Team relay

There will be a team relay event, time permitting, and each team will be made up of four members. Team may be made up of fire fighters from different departments. A female team may not consist of any male member but a 'male' team may include female members. A male team of three male members consisting of one female member will be considered a male team. The four stages of the relay event will correspond with the individual stages.

Individuals and corporates are encouraged to support this event aimed at enhancing service delivery through fitter, stronger fire fighters, build community relations, motivate fire fighters and restore local and national pride in the fire services.

Contact Mark Smith

Toughest Firefighter Alive South Africa

Cell: 071 676 4272

Email: tfa@fireandrescue.co

www.frimedia.org/tfa

[Registration form](#) ▲



TOUGHEST FIREFIGHTER ALIVE SOUTH AFRICA

Open challenge

5-7 Oct 2023



MOSSEL BAY

Working on Fire 20th Anniversary Fire Symposium

8 to 10 November 2023

The United Nations Environment Programme (UNEP) recently released report Spreading like Wildfire: The Rising Threat of Extraordinary Landscape Fires, finds that climate change and land-use change are making wildfires worse and anticipates a global increase of extreme fires even in areas previously unaffected. Uncontrollable and extreme wildfires can be devastating to people, biodiversity and ecosystems. They also exacerbate climate change, contributing significant greenhouse gasses to the atmosphere. The report estimates that the risk worldwide of highly devastating fires could increase by up to 57 percent by the end of the century.

According to a study that suggests extreme fire weather is being driven by a decrease in atmospheric humidity coupled with rising temperatures, the world's eight most extreme wildfire weather years have occurred during the last decade.

"Extreme conditions drive the world's fire activity," said former University of Alberta wildfire expert Michael Flannigan, who conducted the research with study lead Piyush Jain, research scientist with Natural Resources Canada and Sean Coogan, post-doctoral fellow in the Faculty of Agricultural, Life and Environmental Sciences.

The UNEP report calls for governments to dramatically shift their

approach to preventing, rather than only focusing on fighting, fires, which they said would be more effective.

The UN report recommends "two-thirds of spending in planning, prevention, preparedness and recovery, with one-third spent on response."

The award-winning Working on Fire programme, funded through the government's Expanded Public Works Programme (EPWP) in South Africa is celebrating its 20th Anniversary in 2023. As part of its celebrations, we are hosting a fire management symposium at the scenic Skukuza Conference Centre in the Kruger National Park in Mpumalanga, South Africa.

This event is proudly being supported by the Forestry Department of the Nelson Mandela University (NMU). This Department of NMU is recognised for its excellence and has earned the respect of the wider fire community through their various education programmes as well as bi-annual symposiums.

The theme of the symposium is to foster greater collaboration, within and between states and is intended to provide a platform for greater collaboration on the African continent and international wildland fire forums. The event caters for a very wide audience but will have a narrower focus on policy and decision makers. Local authorities, fire protection associations, Government policy makers, forestry companies,

conservation agencies and the agriculture sector are therefore urged to participate in this event as it will serve as a platform for a fresh look at coordination and collaboration between stakeholders involved with Integrated Fire Management activities and responsibilities.

To register, attend, exhibit or to submit abstract submissions to be part of the programme visit: <https://workingonfire.org/fire-management-symposium>

Key information about symposium and registration

- Conference dates: Wednesday, 8 November 2023 to Friday, 10 November 2023
- Venue: Skukuza Conference Centre, Kruger National Park
- Conference costs (three days), inclusive of tea/coffee and lunch: R 2 850 per delegate
- Full conference programme and speakers finalised: 15 August 2023
- Register early to take advantage of the discounted registration rates.

For registration and accommodation booking please contact Jackey Deacon on email: dot@mpu.co.za.

For more information on the Fire Symposium contact Linton Rensburg on email: linton.rensburg@wofire.co.za.

Fire and Rescue International is proud to be the media partner for the Working on Fire 20th Anniversary Fire Symposium. ▲



WORKING ON FIRE 20th Anniversary Fire Symposium

8, 9 & 10 Nov 2023 | Skukuza Conference Centre in
Kruger National Park

TO REGISTER, ATTEND, EXHIBIT OR TO SUBMIT ABSTRACT SUBMISSIONS TO BE PART OF THE PROGRAMME PLEASE GO TO:
<https://workingonfire.org/fire-management-symposium>



DMISA Disaster Risk Reduction Conference 2023

25 to 26 October 2023



DMISA DRR Conference 2023 is hosted at the Kalahari Waterfront, Budeli Village (Nandoni Dam), Thohoyandou, Limpopo Province, South Africa.

The 2023 DMISA Disaster Risk Reduction Conference will be held on 25 to 26 October 2023. This year's conference will be held at the Kalahari Waterfront resort, Thohoyandou, in the Vhembe District of South Africa's Limpopo Province. Nestled in the warm heart of Limpopo, the Kalahari Waterfront resort is a short drive from the centre of Thohoyandou and a scenic 152km drive from the Polokwane International Airport.

DMISA, the Disaster Management Institute of Southern Africa, is the professional association and community of practice for Disaster Management in Southern Africa and the South African Qualifications Authority (SAQA) recognised professional body for Disaster Management in South Africa.

The theme of the 2023 conference will be 'Risk informed action', multi-hazard, multi-sectoral, inclusive, accessible, professional disaster risk reduction.

The esteemed panel of local and international speakers will explore topics on:

- Risk informed development for resilience building in a quest

for sustainable development in Southern Africa.

- Risk informed mitigation, adaptation, preparedness, response, relief, reconstruction and rehabilitation.

The annual Disaster Risk Reduction (DRR) Conference of the Institute is a highlight on the Disaster Management calendar and before COVID-19 routinely attracted more than 300 delegates. The Institute is recognised as the mouthpiece of the Disaster Management profession in Southern Africa and is now rebuilding this annual in-person learning and networking opportunity.

Proudly presented by the Disaster Management Institute of Southern Africa (DMISA) in partnership with the Vhembe District Municipality and supported by the South African National Disaster Management Centre (NDMC), the conference provides an annual for a diverse range of stakeholders in disaster management from across Africa to gather and share skills, knowledge and experience.

Programme

Wednesday, 25 October 2023: Conference Day 1: 09h00 to 16h00

Thursday, 26 October 2023: Conference Day 2: 09h00 to 13h00; AGM: 14h00 to 16h00

Accommodation

<https://disaster.co.za/wordpress/wp-content/uploads/2023/07/5-DMISA-DRRC2023-Accommodation-Options.docx>

Exhibition space will be available

Please direct enquiries to Pat Adams: email: office@disaster.co.za

Registration fees

Registration fees, which include all teas as well as lunch on both days and evening functions on 24 October 2023 (Meet and Greet) and 25 October 2023 (Gala dinner) have been set at very reasonable rates as follows:

Members of DMISA: R5 000

Non-members: R5 500

Register online using this link:

[register here](#)

Closing date for registrations and payment: 30 September 2023.

Late registrations, if accepted, will be subject to a penalty of R1 000 per delegate.

Visit

<https://disaster.co.za/conferences/>

You are cordially invited to DMISA DRRC 2023



DMISA

DMISA, the voice of the Disaster Management community and the SAQA recognised professional body for Disaster Management in South Africa, in partnership with the **Vhembe District Municipality**, proudly presents:



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2023

25-26 October

Risk Informed Development for resilience building in a quest for sustainable development in Southern Africa.

Risk Informed Mitigation, Adaptation, Preparedness, Response, Relief, Reconstruction and Rehabilitation

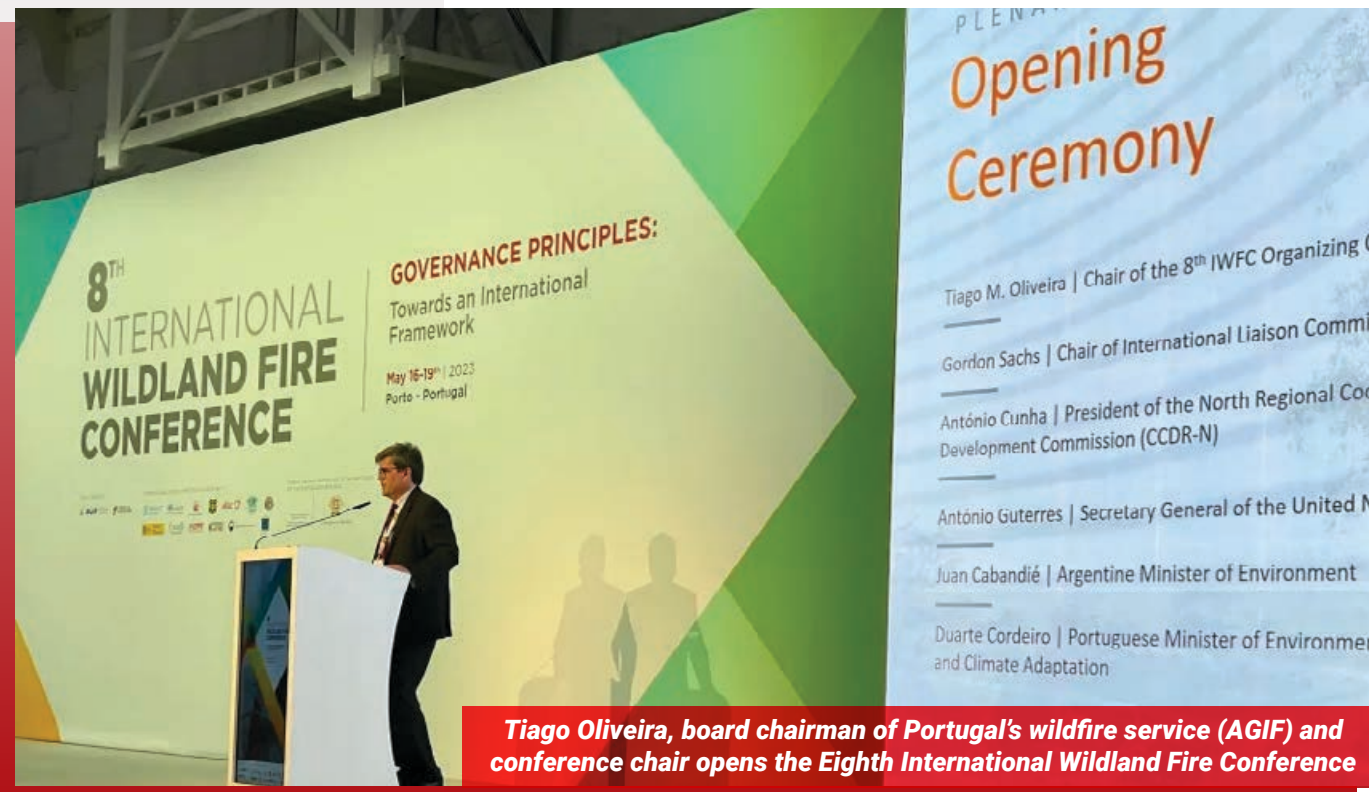
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Working on Fire-Kishugu Joint Venture shares expertise on integrated fire management at Eighth International Wildfire Conference



Tiago Oliveira, board chairman of Portugal's wildfire service (AGIF) and conference chair opens the Eighth International Wildland Fire Conference

The Working on Fire-Kishugu Joint Venture (WoF-Kishugu JV) attended the Eighth International Wildfire Conference (IWFC) in Porto, Portugal. This esteemed conference, scheduled from 16 to 19 May 2023, brought together stakeholders in wildland fire management from around the world.

The WoF-Kishugu JV delegation included three members of the JV's top management ie Trevor Abrahams, project manager; Emile Grobbelaar, aviation representative and Tony Mancos, training representative. Joining them were two women general managers, the Eastern Cape's Phumza Dyantyi and the Western Cape's Antoinette Jini.

The IWFC is a vital platform for governments, wildfire practitioners

and private sector entities to exchange knowledge and establish global partnerships. The conference aimed to develop policies, enhance governance and mitigate the impacts of wildfires on both the environment and humanity.

WoF-Kishugu JV's expertise in Integrated Fire Management Solutions (IFMS) has gained international recognition, with successful deployments in countries such as Indonesia, Chile and Canada. Their participation at the IWFC further strengthened their global presence in wildland fire management.

International collaboration is key According to WoF-Kishugu JV project manager, Trevor Abrahams, international collaboration was a key focus during the conference to

effectively address the challenges posed by wildland fires, which extend beyond national borders in many cases.

"These fires affect multiple countries and regions. Therefore, a coordinated and collaborative approach is necessary to proactively deal with their complex and cross-border nature. The Integrated Fire Management approach, when implemented holistically, provides a framework for comprehensively managing wildland fires. It involves various strategies such as prevention, preparedness, response and recovery, all integrated into a cohesive plan. By adopting this approach, countries can work together to mitigate the impacts of wildland fires more effectively," Abrahams said.

Abrahams added that to ensure the success of integrated fire management, long-term commitments to international cooperation are essential. This includes collaboration in areas such as standards of operation, training, capacity building, cross-border cooperation and knowledge sharing.

He said, "By harmonising policies, guidelines and standards related to fire management, countries can establish a consistent approach across borders. This consistency facilitates mutual understanding and cooperation during transboundary fire incidents."

Women in wildland fire fighting

The IWFC consisted of various plenary sessions, separate break-away meetings, poster talks, a large exhibition, and concluded with a gala dinner. The WoF-Kishugu JV delegation spread itself over several parallel events.

Dyantyi and Jini attended the Women Wildfire session, whose objective was to raise awareness about the challenges women face both working with and as leaders in integrated fire management. It also served as a platform to share data and experiences, inspire people regarding women's role in wildfire prevention and response, to promote international networks and mentorship between women and to promote country-based gender-focused opportunities. The women GMs participated in open discussions on experience and inspiration stories



The WoF-Kishugu JV attended the Eighth International Wildfire Conference (IWFC) in Porto, Portugal

on self-care, leadership positions, fire fighting and networks.

A constant participant

The WoF-Kishugu JV has been present at all but three of the eight conferences. According to Abrahams, this conference actively promoted the notion of "landscape fires", referring to what is often called "wildland fires" or "vegetation fires". "This shift in emphasis is reflective of the view of such fires as a product of human behaviour, rather than a simple endomorphic phenomenon. That is, whether, through human-induced climate change, expansion of the wildland urban interface (WUI), changes in land use or actual ignition activities, the phenomenon of such fires has at its root, human behaviour."

There were several other running themes during the conference, which included prevention - the need for more fire awareness education and

engagement with communities, including revisiting traditional fire management practices, the need for greater collaboration, breaking down the silos, greater preparedness and the need for greater policy harmonisation.

The role of research and use of such information in managing wildland fires was also reiterated, as well as the need to ensure academic research on such fires is made accessible to the entire value chain in fire management.

"The Framework Document, "Governance principles: Towards an international framework" launched at the conference is intended to serve as a summation of the conference proceedings to have government policymakers adopt a common approach to managing the threat of wildland or landscape fires in the context of climate change," Abrahams concluded. ▲



Phumza Dyantyi and Antoinette Jini attended also attended the Women Wildfire session



Fireexpo 2023: building a portal for fire detection and management solutions



Fireexpo celebrated its second birthday at Gallagher Convention Centre in Midrand from 6 to 8 June 2023. Visitor numbers increased by 200 people at this year's event, as did the number of exhibitors. A total combined visitor count over Fireexpo and the co-located Securex South Africa, Facilities Management Expo and A-OSH Expo of 11 465, reached a record high for the shows, indicating that organisations are actively seeking high-quality fire safety, OSH, security and facilities management solutions.

"The crossover between the four co-located shows is large and we found that many visitors who had originally come to source products and services from the other three shows then came to see what the Fireexpo exhibitors had on offer," says Mark Anderson, portfolio director at Specialised Exhibitions, a division of Montgomery Group.

Feedback from the visitors to Fireexpo was very positive. "I managed to make some good connections", said Graham Leach, Uphondo. "In general, the show was excellent. There was a lot of new technology. This type of event is great for networking and attending seminars", said Jaco Claasen, Bluemarble Risk. "I attended the shows to familiarise myself with the latest trends and make connections. The exhibitors were very professional", said Mohamed Rahmtalla, University of Witwatersrand. "The show was great. We are considering becoming exhibitors at the 2024 show", said Jean Borman and Kobus Meyer, P and C.

The Fireexpo exhibitors were very happy with the quality of visitors attending. "We have 12 Securex/Fireexpo exhibitions under our belt.

We had visitors from the DRC, Zimbabwe, Malawi and Tanzania who are proactively sourcing solutions for their future needs. A huge shout out to Specialised Exhibitions for the effort put into marketing and organising the expo – the success was apparent in the large number of high-quality visitors", said Frikkie Strohof of Safequip.

"We are previous Securex exhibitors but haven't been on the show for a few years. However, this year we joined forces with our supplier Carrier Fire and Security South Africa, rebranding as Kidde Commercial and taking a stand at Fireexpo was the best decision we could have made. Our stand was extremely busy and we saw a mixture of end users, insurance companies, installers and representatives from government departments including the

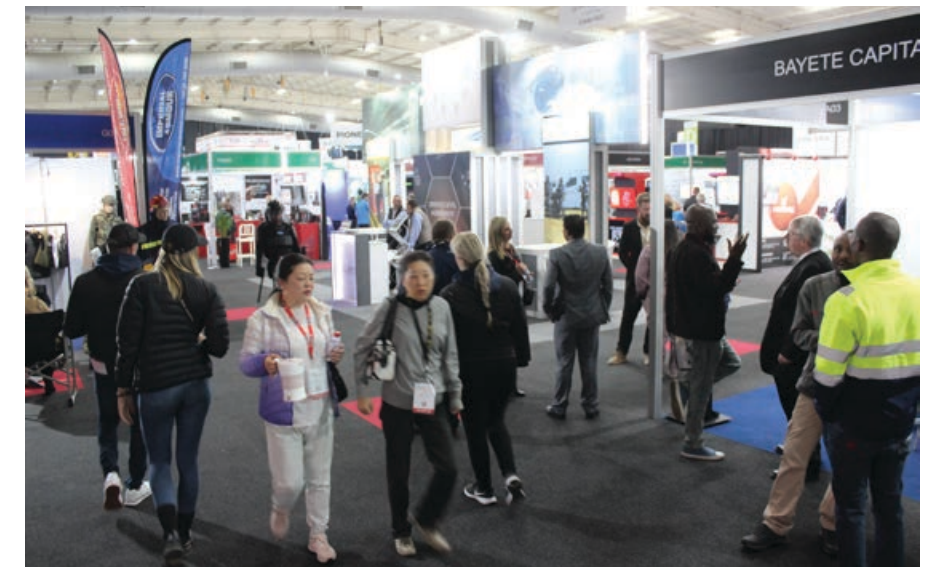
Department of Correctional Services. We were thrilled with the co-location of Fireexpo with Securex, A-OSH Expo and Facilities Management Expo – it is the ideal mix and brings in potential customers from all our target markets" said Nichola Allen of G2 Fire.

"We wanted to demonstrate how we can integrate hardware and software solutions for the fire safety market and we believed that Securex and Fireexpo were the ideal platforms to do so. As first-time exhibitors, we are very happy with the turnout and variety of visitors and on the first day, we had already accumulated 25 solid leads. We are committed to being at the expos next year and expanding into new markets", said Barry Radmore of IBR Buzz-Apex

There was great interest shown in both the live demonstrations and the additional visitor attractions. The four free-to-attend seminar theatres, Securex Seminar Theatre, powered by UNISA, Facilities Management Seminar Theatre powered by Broll Integrated Facilities Management, the Saioosh Seminar Theatre, and the Working at Height Theatre, powered by SafetyCloud, were packed to capacity on all three days of the shows. In addition, the visitors were able to take in the SAIDSA Techman Competition, the OSPAS Awards, the SAIOSH Health and Safety Conference, the SAIDSA and ESDA breakfast, the K9 Law Enforcement demo, the new products display and the premier visitor lounge.

"The success of Fireexpo can be attributed to several stakeholders, our exhibitors, the visitors seeking fire safety solutions, the industry bodies we have partnered with, our sponsors and our media partners. Fireexpo and the co-located expos were so successful this year and the demand from exhibitors has been so high, that we will be expanding into Hall 4 for the 2024 event, which will be held at Gallagher Convention Centre from 28 to 30 May 2024," says Anderson.

Organisations wishing to exhibit at Fireexpo 2024 can contact



Zelda Jordaan on email: zelda.jordaan@montgomerygroup.com to book a space or capitalise on a sponsorship opportunity. Engage with Fireexpo 2024 on social

media using the show hashtag [#Fireexpo2024](#).

Our photo collage includes both Fireexpo and A-OSH 2023 photos. Enjoy! ▶



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Safequip
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A New Hope Dog Rescue
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The invention of the Manby Mortar by British inventor, George William Manby (1765–1854)



Oil painting of Captain George William Manby, 1808

The Manby mortar or Manby apparatus was a maritime lifesaving device originated at the start of the 19th-Century, comprising a mortar capable of throwing a line to a foundering ship within reach of shore, such that heavier hawsers could then be pulled into place and used either to direct a rescue-boat to the ship, or, later, to mount a Breeches buoy.

The apparatus was invented by Captain George William Manby, inspired by his witnessing a ship HMS Snipe (1801) run aground off Great Yarmouth in 1807.

The first recorded rescue using the Manby apparatus was on 18 February 1808, with Manby himself in charge. The crew of seven were brought to safety from the Plymouth Brig Elizabeth, stranded off the shore

at Great Yarmouth. It was estimated that by the time of Manby's death nearly 1 000 persons had been rescued from stranded ships by means of his apparatus.

The crew of a brig was rescued at Yarmouth by the use of Manby's device fired from a carriage gun and supervised by Manby.

Captain G Manby's invention of throwing a rope to a ship stranded on a lee shore, for the purpose of saving the crew, proved the certainty of its never-failing success on the Elizabeth of Plymouth that was wrecked on the beach at Yarmouth in the tremendous gale of the 12th instant; the master, who is part owner, making so grateful an affidavit before the Mayor of that place, he expressed a desire to see the experiment tried in the presence of Vice Admiral Douglas, several officers of the Navy, the merchants and many persons from different parts of the coast; the wind was blowing very fresh on shore and the spot chosen 130 yards from a stranded brig, with all her emblems of distress flying. A galloper carriage, drawn by one horse, brought, with considerable expedition, every requisite for the service; a 5 1/2 inch royal mortar being dismantled, a 1 1/4 inch rope (having a 24 pounder shot appended to it) was staked in its front; about two feet from the shot the rope passed through a collar of leather, effectually preventing its burning; being projected by one pound of powder, more than 100 yards over the vessel, part of the rope fell upon the rigging.

The persons on board returning a rope by the one sent, hauled off a



stout rope, with a smaller one rove through a tailed block; the larger being made fast to the foot of the main top mast, the other end to a long, gun tackle, secured to three iron-shod stakes, driven triangularly in the ground; the tackle being bowsed, kept the rope sufficiently tight and by persons easing off the fall, as the ship rolled, prevented danger to the rope or to what it was lashed being carried away; the tailed block was made fast under the large rope and each end of the small rope to the extremities of a hammock, extended by a stretcher of wood, (fitted up like the pole of a tent, for the convenience of a carriage), having gudgeons with forelock pins, through which was rove the great rope. By the assistance of one person from the shore, the hammock travelled to and fro, bringing all the people who were assembled in the main top, one by one, in perfect ease and safety; a service that can always be performed, when it is impossible for any boat to give the least assistance and be done when persons are initiated in the several uses, in a quarter an hour.

Every person present testified their highest approbation and several gave certificates that had a similar system and apparatus been placed at Lowestoft, Yarmouth, Winterton



The Manby mortar; bronze model, inscribed 'GW Manby Capt FRS Inventor'

and Happisbro', on 18 February 1807, on which distressing day the idea first suggested itself to the inventor, more than 100 persons would have been saved.

It is most earnestly to be hoped it will be generally adopted, being a circumstance of such magnitude to the country and deeply interesting to the world at large.

Manby was one of those to receive an honorary award at the Annual Festival of the Royal Humane Society in the May following the rescue.

In June 1808, Manby received a gold medal from The Society for the Encouragement of Arts, Manufactures and Commerce, via the hands of Henry Howard, 13th Duke of Norfolk, for forming a communication with ships by means of a rope thrown over the vessel from a mortar gun on the shore.

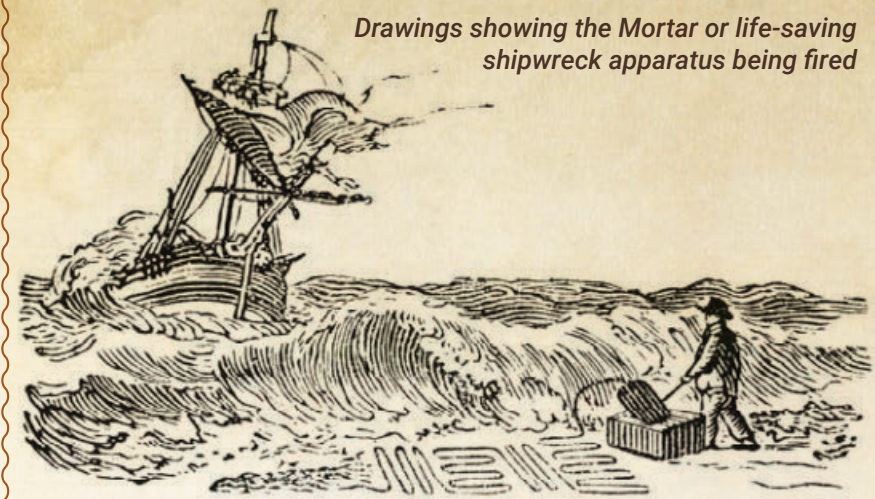
It was used by the Sea Fencibles by 1809, Waterguard and later by H M Coastguard for many years.

Earlier attempts

There had been earlier unsuccessful attempts at similar ideas, including by the French agronomist and inventor Jacques Joseph Ducarne de Blangy and a ship to shore idea by Sergeant John Bell, in 1792 the Society for the Encouragement of Arts, Manufactures and Commerce gave him a bounty of fifty guineas, he was at that time a sergeant,



A stranded vessel. The Snipe Gun-Brig grounded at Great Yarmouth in 1807 with the loss of 67 lives' by Francis Sartorius, oil on canvas



Drawings showing the Mortar or life-saving shipwreck apparatus being fired

rescued off Hartlepool by the use of a rocket. Eventually the Manby mortar was replaced by rockets. In 1967 a documentary on the inventor was made. Locations included Denver, Downham Market and Great Yarmouth. Scenes include the use of the mortar, rocket and breeches buoy. The recording is now available on the East Anglian Film Archive website.

Captain George William Manby FRS (28 November 1765 – 18 November 1854) was an English author and inventor. Apart from the Manby Mortar, he also designed the first modern form of fire extinguisher.

Other awards

In August 1808, Manby received a medallion from the Suffolk Humane Society.

In 1838 he met Marshal Soult as part of his campaign to involve France and other nations in achieving a worldwide policy for the treatment of shipwrecked mariners and their cargos.

Manby received a belated Queen Victoria Gold Coronation Medal in March 1842.

Sources: [Sea History Differently](#), [Wikipedia](#), [Royal Collection Trust](#) ▲



► afterwards a lieutenant in the Royal Artillery. In 1807 the same society furnished some further particulars, with a plate of the apparatus.

The Manby apparatus was also prefigured by proposals, unfulfilled, made by George Miller as early as 1793 to the Society for the Encouragement of Arts, Manufactures and Commerce for the purchase of a mortar and line to rescue people from vessels wrecked on the Dunbar shoreline. Miller was instrumental in the purchase of a lifeboat for Dunbar, amongst the earliest (though not the first) in Britain.

Development

Early problems were with the chain snapping or line being burnt through by the ignition of the charge. Later Manby credits Captain Harris RN of the Colonial Ropery at Great Grimsby (opened in 1835) with supplying rope more suitable for this use, due to its lightness, pliancy, strength and durability, at the Lincolnshire Shipwreck Association trials of the mortar and Mr Dennet's rocket apparatus held at Cleethorpes in 1838.

The success of rescues depended upon both the team operating the mortar and the crew of the vessel

in distress. Unfortunately, even as late as 1844 a letter published in the Shipping and Mercantile Gazette described the loss of life of the York Union at Winterton and the Sarah of Goole driven ashore at Corton, due, it is thought, to their crews not knowing their role in operating the equipment.

In the United States the limited range of the Manby mortar was overcome in the second half of the 19th Century by the development of the Lyle gun.

As early as 1842 the crew of Huzza from the port of Wisbech were

What's On?

2023

September

13 September 2023

International Day for Disaster Risk Reduction 2023 (IDDR)

Visit: <https://iddr.undrr.org/>

14 - 17 September 2023

ISAF Fire and Rescue 2023

The 27th International Fire, Emergency, Search and Rescue Exhibition, the only exhibition held in Turkey for many years in the fields of "Fire, Emergency and Search and Rescue", is preparing to bring together all segments of the sector. ISAF Fire and Rescue is a fire exhibition that covers all processes related to fire, although the fire exhibition is considered as the process only after the fire. ISAF Fire and Rescue is an exhibition where all products ranging from the first stage to the last stage of fire safety are exhibited and followed by users at every levels.

Venue: Istanbul Fuar Merkezi Yeşilköy, Turkey

Visit: www.expointurkey.org/isaf-fire-rescue-2023

27 - 28 September 2023

Disasters Expo USA, Anaheim, USA

The Disasters Expo USA is designed to bring together the professionals within the disaster management and emergency response industry.

Venue: Anaheim Convention Center, Anaheim, USA

Visit: www.disasterexposcalifornia.com/

October

5 - 7 October 2023

Toughest Fire Fighter Alive 2023

This year's competition promises to be more competitive due to the better being better prepared for the event. Individual, team, relay, best newcomers are the categories that the entrants will be vying for. All participants are encouraged to register before the deadline to avoid missing out on South Africa's premier fire fighter competition!

Venue: Mossel Bay, South Africa

Visit: www.frimedia.org/tfa

12 - 14 October 2023

Florian 2023, Dresden, Germany

Trade fair for fire brigades, civil defence and disaster control

Venue: Dresden, Germany

17 October 2023

Fire Conference 2023, London, UK

A key focus point for sector leaders and stakeholders to come together in a collaborative format to discuss and debate the major challenges affecting fire safety.

Organised collaboratively between the IFE, FPA, the NFCC and the FSF, this sector-leading annual event will once again be delivered in a hybrid format, enabling delegates to attend in person or online.

Venue: The Institution of Engineering and Technology, Savoy Place, London, UK

Visit: <https://www.ife.org.uk/Events/Fire-Conference-2023/70119>

17 - 19 October 2023

Africa Health, Johannesburg, South Africa

Africa's leading healthcare and medical laboratory expo

Venue: Gallagher Convention Centre, Johannesburg, South Africa

Visit: www.africahealthexhibition.com/

25 - 26 October 2023

DMISA Disaster Risk Reduction Conference 2023

The annual Disaster Risk Reduction (DRR) Conference of the Institute is a highlight on the Disaster Management calendar and before COVID-19 routinely attracted more than 300 delegates. The Institute is recognised as the mouthpiece of the Disaster Management profession in Southern Africa and is now rebuilding this annual in-person learning and networking opportunity.

Venue: Kalahari Waterfront, Budeli Village, Thohoyandou, Limpopo, South Africa

Visit: <https://disaster.co.za/conferences/>

November

8 - 10 November 2023

Working on Fire 20th Anniversary Fire Symposium

The award-winning Working on Fire programme, funded through the South African government's Expanded Public Works Programme (EPWP) in South Africa is celebrating its 20th Anniversary in 2023. As part of its celebrations, we are hosting a fire management symposium at the scenic Skukuza Conference Centre in the Kruger National Park in Mpumalanga, South Africa.

Venue: Skukuza Conference Centre, Kruger National Park, Mpumalanga, South Africa

Visit:

<https://workingonfire.org/fire-management-symposium>

15 - 17 November 2023

SiCUREZZA Internation Security and Fire Exhibition, Milan, Italy

A leading event in Italy and Europe, SiCUREZZA is a showcase of new products and a meeting and discussion tool for all those involved in security and fire fighting technologies.

Visit: www.sicurezza.it/en/manifestazione/la-fiera.html