



FIRE + RESCUE

FIRU NEWSLETTER

ISSUE 9, 26th AUGUST 2019

In this issue

Welcome	1
Biannual Snapshot	1
FIRU News	2
Case Study	3
FI Update	4
K9 Update	5
Research Update	7
Contact us	9

Welcome

It has been a busy period for FIRU since our last newsletter. So busy that we have not been able to produce a newsletter on as regular a basis as we would like! We are constantly looking at how best to communicate with our newsletter readers – there is a possibility that the format of our newsletter could look quite different into the future.

It has been a period of change in the make up of our team, with a couple of staff moving back to Operations to further develop their careers. It is always sad to see staff move on, but it does mean that we have a couple of new faces in the team who come to us with fresh ideas. We have also added a few new Relieving Fire Investigators to our team, who come to work with us to fill vacancies that are created by staff on leave. We value the contribution that they make as well as the support from their home Commands in releasing them for this opportunity.

We have some interesting content in this edition of the newsletter, including a follow up to the Polyaire fire story in our last issue about the testing that we conducted to test our hypothesis for the cause of the fire. I won't give it away, but a very interesting outcome!

Don't forget to send us feedback at firu@fire.nsw.gov.au if you have any suggestions of how we could improve the way we communicate with you.

Superintendent Graham Kingsland, Manager FIRU

SNAPSHOT	JAN-JUL
INCIDENTS ATTENDED	124
K9 DEPLOYMENTS	46
RPAS DEPLOYMENTS	42
FATALITIES ATTENDED	11
DETERMINATIONS:	
ACCIDENTAL	22%
INCENDIARY	34%
UNDETERMINED	40%

ATTENTION ALL FIREFIGHTERS VACANCY IN K9 UNIT

If you've had at least 48 months of service from your date of commencement as a recruit firefighter and want to challenge yourself with a unique and rewarding position, then you can apply for the role of canine handler!

All inquiries to:
Superintendent Graham Kingsland
by email or [0414 637 206](tel:0414637206)

Applications close
11th September 2019

Taleo Reference: 000076XG



STAFF CHANGES IN FIRU

There has recently been a couple of staff changes at FIRU. One of our K9 Handlers, Joel Walton has recently decided that he would like to get back to front line operations after a nearly 10-year stint within our K9 Team. Joel has given dedicated and professional service to our team and he will be hard to replace. A special thanks goes to Joel for his time with us.

Tara Burton, one of our Fire Investigators has also made the decision to return to operations. Although a much shorter stint with the team, Tara had no less of a positive impact on the unit and the culture within the team. Thank you, Tara.

Tara's replacement has now been selected after a very competitive recruitment process. We welcome Andrew Low to the team. Andrew will be spending the coming period of time working towards becoming a Fire Investigator in his own right.

FIRU also recently welcomed the addition of a new Research Officer – Rylee Lam. Rylee is a great addition to our team and comes with a strong forensic and research background, having worked as a staff member at Western Sydney University in the Forensic Science Research Team.

Graham Kingsland

FIRU VISITS SAMSUNG HQ

Dec 2018: Staff from FIRU along with other fire investigators from New Zealand and Queensland attended Samsung head office to be trained by their experts from Korea in how to correctly identify Samsung products that have been involved in fire. With fires still occurring in their washing machines, this was a valuable visit and showed a cooperative approach Samsung has taken with fire investigators around the country.



FROM INSPECTOR TO CHIEF SUPER—KEITH EADIE IN FIRU

Jul 2019: It was with sadness that we received the news of the passing of retired Superintendent Keith Eadie. Keith served with FIRU in the late eighties and early nineties before being promoted to Deputy Regional Commander. Our sympathy goes out to his family at this time of great loss.

Graham Kingsland

AFAC FIRE INVESTIGATION NETWORK NEWS

Aug 2019: The Managers of the Fire Investigation and Research Units around Australia and New Zealand are all members of the AFAC Fire Investigation Network. AFAC recognises and values the importance of a collaborative approach to enhance the collective fire investigation capability. The FIN regularly come together to share knowledge, exchange insights, explore opportunities and create solutions that shape best practice.

The FIN recently gathered together in Melbourne for a two-day meeting. Topics discussed included, the emerging risk of lithium-ion battery storage systems, AFAC Professionalisation Scheme for Fire Investigators, the working group review of the Advanced Diploma Public Safety (Fire Investigation), agency updates, as well as many networking opportunities between the various agencies.

The group also had the opportunity to visit CSIRO's Clayton Research Facility and witness some destruction testing of lithium-ion battery cells.

The collaboration between the member agencies that these opportunities foster is invaluable to all present.

Graham Kingsland

FIRU IN THE NEWS

Apr 2019:

The changes to automatic fire suppression system laws in the 2019 National Construction Code were launched at a media day at Londonderry with industry collaborators.



Jun 2019: "Australia's Hero Dogs" Sunrise story on Australia's different canine units featuring our own accelerant detection dogs and their contribution to fire investigation.



"They've proved their worth time and time again"

TESTING THE HYPOTHESIS

Overview

In our last issue we detailed the investigation into the 9th Alarm at Seven Hills. FIRU had two pallets of product, similar to what was stored at the rear of the Polyaire factory, delivered to the Research and Test Facility operated by Fire & Rescue New South Wales (FRNSW) at Londonderry. The company provided them the week after the fire. The two pallets contained the Polyaire Y splitter fittings with 63 (7 layers of 9 on each row separated by cardboard) on each pallet. Plastic film wrapped both pallets individually with some minor gaps and holes in the plastic.

On Monday 17th December 2018 fire investigators from FIRU and three private fire investigators arrived at the Research Facility to conduct testing on the two pallets. The forecast for that day was to be hot with no clouds and light winds. Temperatures were expected to reach 34°C. These conditions were similar to what was experienced on the day of the fire.

The two pallets were stacked on the ground then three depressions were created on the two pallets. Water was then poured into these depressions to create a pool to simulate the pooling of rainwater. It was hypothesised that this pool of water could create a lens that magnifies the sun's rays, creating a focal point that could ignite a combustible material.

Within 30 minutes, smouldering to the cardboard between the layers was observed in two of the pools.

One of the pools continued to burn the cardboard but did not progress to the flaming stage after over an hour.

The other pool continued to burn a hole in the cardboard inside the pallet. Smoke generation increased and a PPV was introduced to simulate the high winds experienced on that day. Just after 3 hours of smouldering, flaming ignition occurred. The fire increased rapidly due to the burning of the plastic mould and the polyurethane on the splitters.



The summary of the testing showed:

- Of the three pools of water created in the clear plastic that covered the product, two of them initiated ignition.
- The cardboard ignited easily if the focal point from the sun's rays were focused on it.
- The yellow polyurethane only charred when the sun's rays were focused onto it. It could not sustain combustion.
- The black plastic moulding only melted when the sun's rays were focused onto it. It could not sustain combustion.
- The composition of the honeycomb cardboard allowed air to be readily available to the smouldering cardboard which then became self-sustaining.
- Further hypothesis testing was not conducted due to the results of this testing.

The cause of the fire was the pooling of rainwater creating a lens which acted to magnify the sun's rays, which ignited the cardboard packaging. Once flaming ignition had been reached this ignited the high fuel load of polyurethane, moulded plastic, cardboard and plastic wrap. The classification for this fire was Natural.

This was an incredible result and involved all the investigators, both public and private, working together to develop and test the hypothesis. This is exactly how the scientific method should be used in fire investigation and a great study into how fire can be created from water.



FIRE INVESTIGATION

NEW STAFF Q and A—FI JACK EDMAN

What is your normal position?

Firefighter based at Burwood on D Platoon.

Why did you become interested in Fire Investigation?

We have assisted FIRU at a few incidents that we have attended in the past. I was drawn to the way in which the investigator was able to decipher patterns and work out the fire's development in a room that to me just looked like a burnt and blackened mess.

How did you find the process of being trained as a Fire Investigator?

Extremely interesting. It was fantastic to work with attending fire crews to gather information and to work along side other agencies including Crime Scene.

You begin training by assisting and shadowing an investigator. You then slowly take a more active role in different parts of the investigation as you acquire and learn more skills. An assessment by the Team Leaders is then undertaken if key criteria are met.

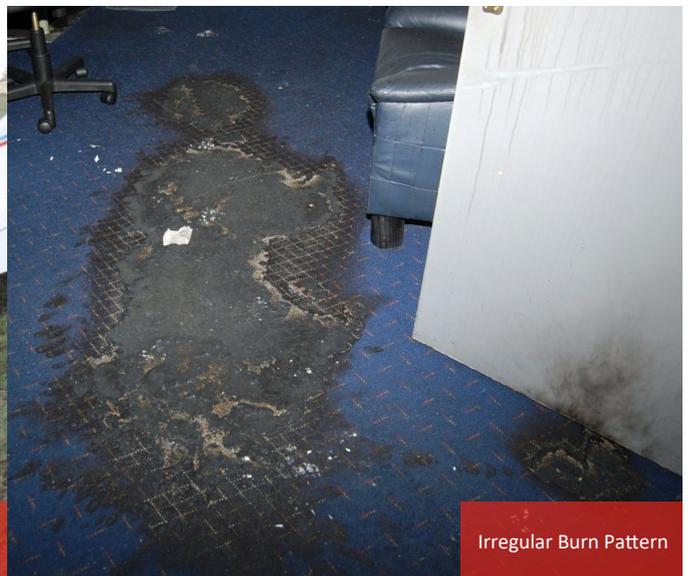
What has been the challenges been in becoming a fire investigator?

The reporting side of an investigation is thorough and requires meticulous titling. This was a learning curve for me as my computer and formatting skills definitely needed some work. The photography side of an investigation is also challenging, it is quite an art to take an effective photo of a black and dark scene.

Jack Edman



Trailer on ground heading towards an aircraft



Irregular Burn Pattern

COMMON BURN PATTERNS - IRREGULAR BURN PATTERNS AND TRAILERS

DEFINITIONS:

Trailer: Solid or liquid fuel used to intentionally spread or accelerate the spread of a fire from one area to another.

Irregularly shaped fire patterns: Fire patterns resulting from the burning of ignitable liquids.

CAUSE:

In the case of incendiary fires, when fuels are intentionally distributed or "trailed" from one area to another, elongated patterns may be visible. Such fire patterns can be found along floors and other horizontal surfaces to connect separate fire sets, or up stairways. Fuels used for trailers may be ignitable liquids, solids, or combinations of these. Depending on the type of fuel used, portions of the trailer may survive the fire.

Irregular, curved, or "pool-shaped" patterns on floors and floor coverings should not be identified as resulting from ignitable liquids on the basis of visual appearance alone. In cases of full room involvement, patterns similar in appearance to ignitable liquid burn patterns can be produced when no ignitable liquid is present.

The term *pour pattern* implies that a liquid has been poured or otherwise distributed, and therefore, is demonstrative of an intentional act. Because fire patterns resulting from burning ignitable liquids are not visually unique, the use of the term *pour pattern* and reference to the nature of the pattern should be avoided. The correct term for this fire pattern is an *irregularly shaped fire pattern*. The presence of an ignitable liquid should be confirmed by laboratory analysis. The determination of the nature of an irregular pattern should not be made by visual interpretation of the pattern alone.

REFERENCES: NFPA 921: *Guide for Fire and Explosion Investigations, 2017 Edition.*

FIRE INVESTIGATION

FIRU TRAINING NEW RELIEVING INVESTIGATORS

At the beginning of the year investigators began training up pool of candidates that could be used as relieving investigators. This would allow better capability when the permanent investigators took leave or had other opportunities outside the unit. There are only four investigators that rotate the on-call and when one or two of these take leave it puts a lot of stress onto the remaining investigators. This is where a relieving investigator can help out.

The process for being trained is to be seconded to FIRU for a month or more so that they can attend incidents as the investigator. Once they feel confident in

leading an investigation from start to finish they are assessed by two of the investigators at different incidents before they can conduct an investigation by themselves. Once this is complete they are encouraged to complete an education course in fire investigation either through Charles Sturt University or Canberra Institute of Technology.

So far this year four firefighters have been trained up to become relieving investigators. They are QF Jack Edman, SF Dave Koster, SO Dave Cross and LSO Chris Forster. They now join our other relievers who are SF Sue Bayliss, SF Tara Burton, SO Jock Gilmour and SO Chris Hughes.

Michael Forbes



QF Jack Edman in training



ACCELERANT DETECTION CANINES

AN UPDATE FROM OUR K9 TEAM LEADER

The first half of this year has seen some big changes within the canine unit.

Firstly after a lengthy recruitment campaign we finally secured a new handler for 5 year old K9 Viking. Since Inspector Phillip Etienne finished his 15 year tenure with FIRU last year Viking had been in boarding so it was fantastic to be able to pair him up with newly appointed handler Craig Gordon.

Craig had been at 62 D platoon for 4 years before joining FIRU and has taken to the new role enthusiastically. So enthusiastically that just as he developed a good working bond with his new partner he promptly took leave to be with his other partner to welcome Noah into the world. Having ensured that all at home are happy and healthy Craig is back with lead in hand and continuing his training in good form.

At the end of the recruitment process for Craig's position as K9B we were able to create a talent pool from applicants who had applied. This was immediately utilised to fill the K9A position as Joel Walton had returned to station for skills maintenance.

SO Brad Giersch then joined us for 3 months finishing up at the start of August. During that time Brad trained alongside Craig and Viking with Opal the 7 year old matron of the K9 trio. Brad was extremely engaged with the work of FIRU having worked closely with the investigators after being 1st arriving station at the tragic Rozelle incident of 2014. Brad's tenure with the unit allowed enhanced experience in the investigation realm as well appreciating the challenges of the handler role - a role that he obviously enjoyed. At the end of the July we saw Brad return to 42 C.

Tim Garrett



QF Craig and SO Brad with Viking

ACCELERANT DETECTION CANINES

FAREWELL JOEL WALTON

Unfortunately for the unit in July we were hit with the loss of having Joel not return from Station Land. Having been a handler for 10 years Joel decided that he would permanently hang the dog lead up and return back to ME3 to take up on D Platoon at 52 Station.

During Joel's time with FIRU he worked with two dogs, Winna and Opal. Joel trained Opal, trained the current Team Leader Tim Garrett, was deployed in Victoria assisting Vic Police and attended

over 500 incidents. Having also attained a fire investigation qualification it is a wealth of knowledge and experience that leaves FIRU to join the crew at 52. I can't thank Joel enough for the time and effort he has given to not only the unit but for helping me in my position.

As such we are currently recruiting again for this highly rewarding role that usually do not get advertised often.

Tim Garrett



On the job



VALE WINNA

Jun 2019: Another big loss to the FIRU family was the recent passing of Joel's retired dog Winna, our 5th ADC.

Since her retirement from service (after having four different handlers), Winna become a much loved family companion when SO Matt Wormald was successful in his application to see the rest of her years at Bangor. Subsequently Winna travelled the State of NSW nearly as much as she did when operational - the Wormalds enjoy their camping and Winna was never left behind.

Unfortunately her battle with a number of tumours ended on the 15th of June 2019. She will be remembered fondly by all those who she played alongside.



Winna and the Wormalds

NEW STAFF Q and A—HANDLER CRAIG GORDON

What is your new position at FIRU?

I have taken up the position of Canine Handler Bravo and work alongside Accelerant Detection Canine Viking.

What was your position before joining FIRU?

Prior to commencing at FIRU I was stationed at Bankstown Fire station for 4 years. Before that I was an Aviation Fire Fighter in the Royal Australian Air Force.

What was the reason you applied for the position?

I enjoy working within a team environment and I also enjoy applying scientific thought to everyday process so the Accelerant Detection Canine Handler role with FIRU appealed to me. The role of Canine Handler requires me to think 'on the run' at fire scenes and attempt to piece together the scene to interpret as to

why the Accelerant Detection Canine has or has not indicated.

What has been the best thing about working at FIRU so far?

The opportunities which arise to work and train with so many different people, both FRNSW internal staff but also outside agencies such as NSW Police and many more.

What do you think will be some of the challenges ahead for you in this position?

Maintaining Viking at a level of operational readiness is a very challenging task and requires many hours of training, however by being consistent and thorough, We are prepared for anything!

Craig Gordon

FIRE RESEARCH

WiSE PROGRAM WITH WSU

Jul 2019: For the fourth year running FIRU hosted Western Sydney University's Women in Science and Engineering (WiSE) program. Students visited FIRU's fire research facility where they were engaged in activities that showcased FRNSW's STEM capabilities.

This year brought a full program with a welcome from FIRU's Manager, Supt. Graham Kingsland, highlighting that FRNSW is wider reaching than just plain firefighting. The morning session continued with a range of speakers, from Research Officer Rylee Lam, Research Assistant QF Michelle Engelsman and Fire Investigator SF Sue Bayliss, FRNSW librarian Julie Wyner to Fire Safety Compliance Unit's Building Surveyor Edren Ravino and 077 station's QF Russell Stirton and QF Leo Dulay.

The event concluded with a fire demonstration with Fire Research Team Leader SO Morgan Cook, and an informative session with FIRU's K9 Handler's SF Tim Garrett and SO Brad Giersch and their K9's Gandalf and Opal.

Rylee Lam



NCC2019 SPRINKLER LAUNCH

Apr 2019: The Home Fire Sprinkler Coalition and FRNSW held a Side-by-side burn at our Research and Testing Facility at Londonderry to demonstrate the effectiveness of Residential Fire Sprinklers.

We constructed 2 identical rooms that were built and furnished exactly the same, the only difference was that one included active Residential Sprinklers built to the new Fire Protection Association Australia [FPAA101D specifications](#).

The un-sprinklered room flashed over very rapidly reaching a maximum temperature of 1,245° C. The room with sprinklers reached a maximum of just 90° C and the fire spread was limited to just 1 metre in diameter.

The un-sprinklered room would not have been survivable by any occupant and increased the risk to responding firefighters. The presence of sprinklers in the other room increases the life safety of occupants and firefighters and minimises the environmental impact resulting from toxic smoke, and reconstruction after fire damage.

The Londonderry testing was a huge success further highlighting the FIRU Research capability within FRNSW to our community stakeholders – and beyond.

David O'Brien



RIDE ALONG EXPERIENCE WITH FIRE RESEARCH

Apr 2019: I recently did a ride along with Fire Research and thoroughly enjoyed my time there.

The team is great and they are constantly working on new and interesting projects. During my time working with the Fire Research team, I was involved in setting up and completing a live burn of two identical, replicated lounge rooms. One of the rooms had a sprinkler installation and the other didn't, this burn really highlighted the importance and effectiveness of sprinkler systems. This was a demonstration conducted by the team in conjunction with the changing of National Construction Code 2019.

During my time at Fire Research I was surprised by how much active work they do as I was expecting to spend all of my time at a desk, this was not the case.

Another part of the research I was involved in that I found really interesting was experimenting with the burning of washing machines and dishwashers. By completing these burns we helped to recognise and identify the ignition point within the appliance.

The time that I did spend at a desk was spent researching relevant topics within a fire station, most notably lithium batteries (protection, containment, suppression etc), station design to reduce FF exposure to contaminants and exposure to diesel particulates.

I really enjoyed my time working with the team and feel I took lots of valuable information back to station with me that I can also pass along to my colleagues. Would highly recommend spending some time working within the Fire Research unit.

Scott Zucchetto

FIRE RESEARCH

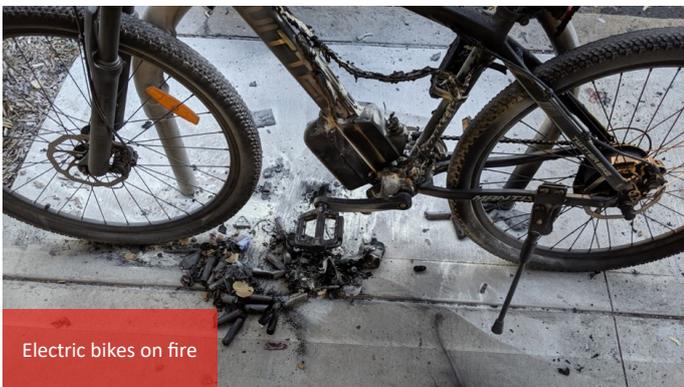
LITHIUM BATTERY FIRE DANGER

Electric Bikes are becoming an extremely popular new technology. The bikes enable us to move more efficiently with minimal pollution and environmental impact. The preferred power sources for the battery packs is the Lithium Ion rechargeable packs that are attached to the upright stem or hung as a bag under the cross bar on the frames.

The bike batteries undergo a regular charge/discharge cycle and can generate a large amount of heat. When the batteries discharge – the individual cells never lose a complete charge and hold capacity despite that power not being made available. The cycle of charge and rapidly discharge when used under load – can also shorten the efficiency of the battery pack and cause shorts within the sealed unit.

The issue we have noticed is either a problem with a charger unit or the pack itself overheating whilst on charge then expulsion of individual cells throughout the room. When the individual cells overheat, they can cause a condition known as “Thermal Runaway” – This condition is when the cell off gases and self-propels outwards whilst on fire. This has and may lead to multiple seats of fire within a room of origin.

If you come across any small fires or large ones related to lithium batteries of any type – **please get in touch** with us at FIRU@fire.nsw.gov.au.



David O'Brien

What has been the best thing about working at FIRU so far?

Contributing to research that has tangible impact.

What do you think will be some of the challenges ahead for you in this position?

Catching up with all forthcoming research projects and applying effective contributions to their design, implementation and reporting.

What are some of the benefits in conducting Fire Research ? Where do you think it will take us into the future?

Fire research leads to detailed and technical insights into human, building and fire behaviour. Using these insights, it is possible to design and develop fire safety and protection systems that take us toward zero fire deaths.

How does Fire Research fit within the Fire Investigation & Research Unit?

Fire research supports industry and government partners with research into higher risk products and practices, fire prevention and fire intelligence and aids fire investigation through hypothesis testing and reconstruction; providing critical data and evidence-based outcomes that assist in reducing undetermined rates. *Rylee Lam*

ARC TRAINING CENTRE LAUNCH EVENT

Jul 2019: In July the FRT attended the launch event of the new UNSW Training Centre in Fire Retardant Materials and Safety Research. The Centre is supported by an Australian Research Council (ARC) grant.

FRNSW are close working partners focussing on key areas to transform Australian industries in producing new fire retardant materials, high-value products and engineering services, improve the fire safety of light-weight structures and fire protection systems.

Partnering with government here and overseas, international companies and universities, the training centre will create knowledge on novel green and durable fire retardant materials, advanced fire models for urban and built environment, fire suppression technology, and new flammability tests for compliance with fire safety regulatory standards. The team are looking forward to this new collaboration.

Morgan Cook



Industry partners at ARC Launch event

NEW STAFF Q and A—RESEARCH OFFICER RYLEE Lam

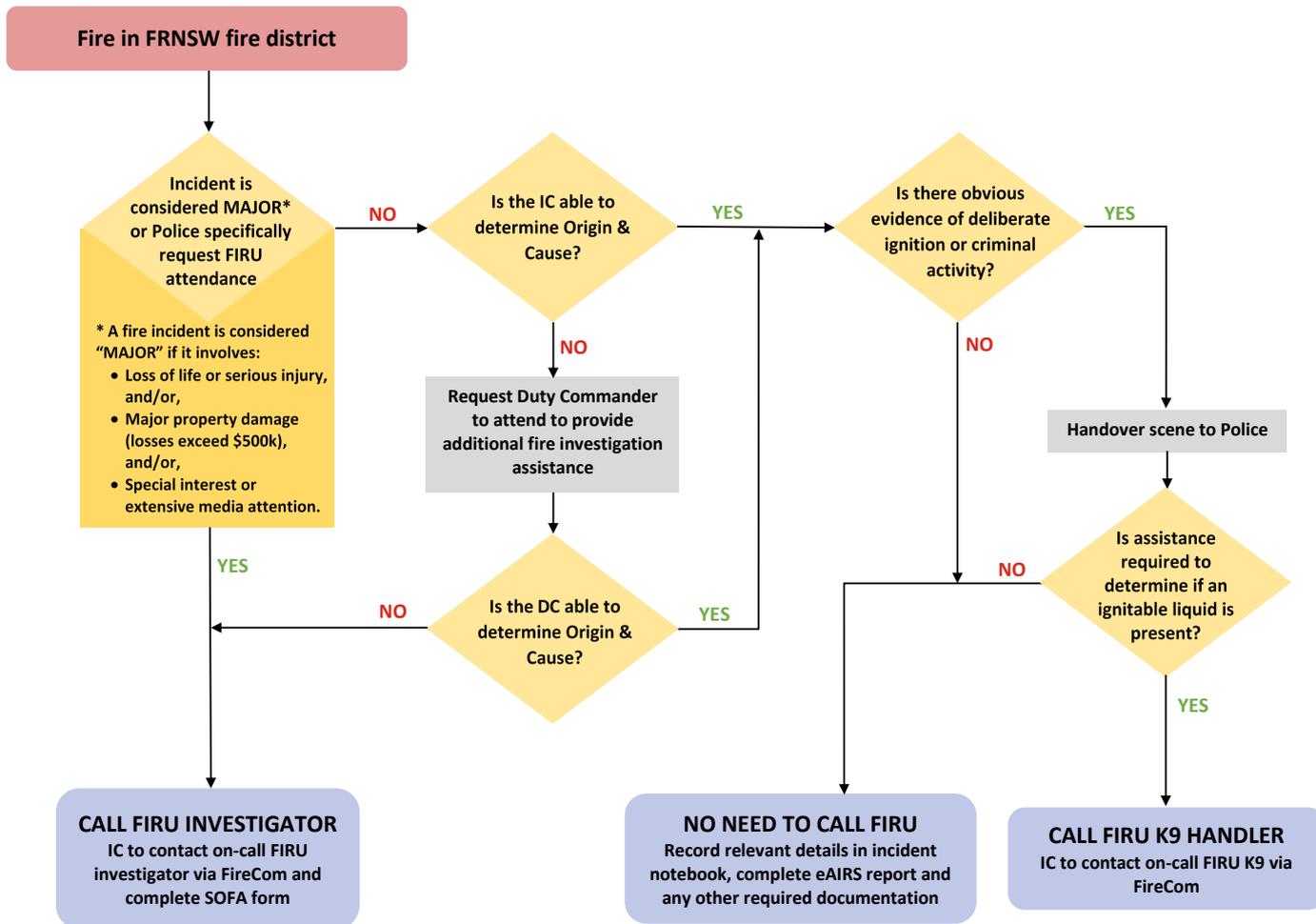
What was your position before joining FIRU?

PhD Candidate at Western Sydney University developing a method for the rapid, on-site identification of hazardous organics at fires with person-portable instruments.

What was the reason you applied for the position?

For the opportunity to further fire research, train in new skills and apply my research experience to new projects.

WHEN TO CALL FIRU



CONTACT DETAILS

Fire Investigation & Research Unit is located at:
Ground Floor Building B,
1 Amarina Ave Greenacre NSW 2190
 Office hours are 0730 to 1730, Monday to Friday

The FIRU Research Testing Facility is located at:
667 The Northern Rd Londonderry NSW 2753
 Visits to the site are by appointment only

For general enquiries:

Phone: **02 9742 7395** | Fax: 02 9742 7385 | Email: firu@fire.nsw.gov.au

FIRU staff are available on-call after hours and during weekends.

CONTACT ON CALL FIRE INVESTIGATORS AND K9 HANDLERS THROUGH FIRECOM

Mail correspondence:

Fire Investigation & Research Unit
 Locked Bag 12, Greenacre NSW 2190

Please mark all FIRU correspondence "PRIVATE & CONFIDENTIAL"

Manager FIRU:	Supt Graham Kingsland
FI Team Leaders:	Inspector Wayne Schweickle (G), LSO Michael Forbes (H) SF Bernard Daly (G), SO Andrew Low (H)
K9 Team Leader:	SF Timothy Garrett (K9 Gandalf, Special Roster)
K9 Handlers:	Vacant (K9 Opal, G), QF Craig Gordon (K9 Viking, H)
Fire Research Team Leader:	SO Morgan Cook (Special Roster)
Fire Research Officers:	SF David O'Brien (G), QF Michelle Engelsman (Special Roster), Rylee Lam
Research Assistant:	Pheo Duong