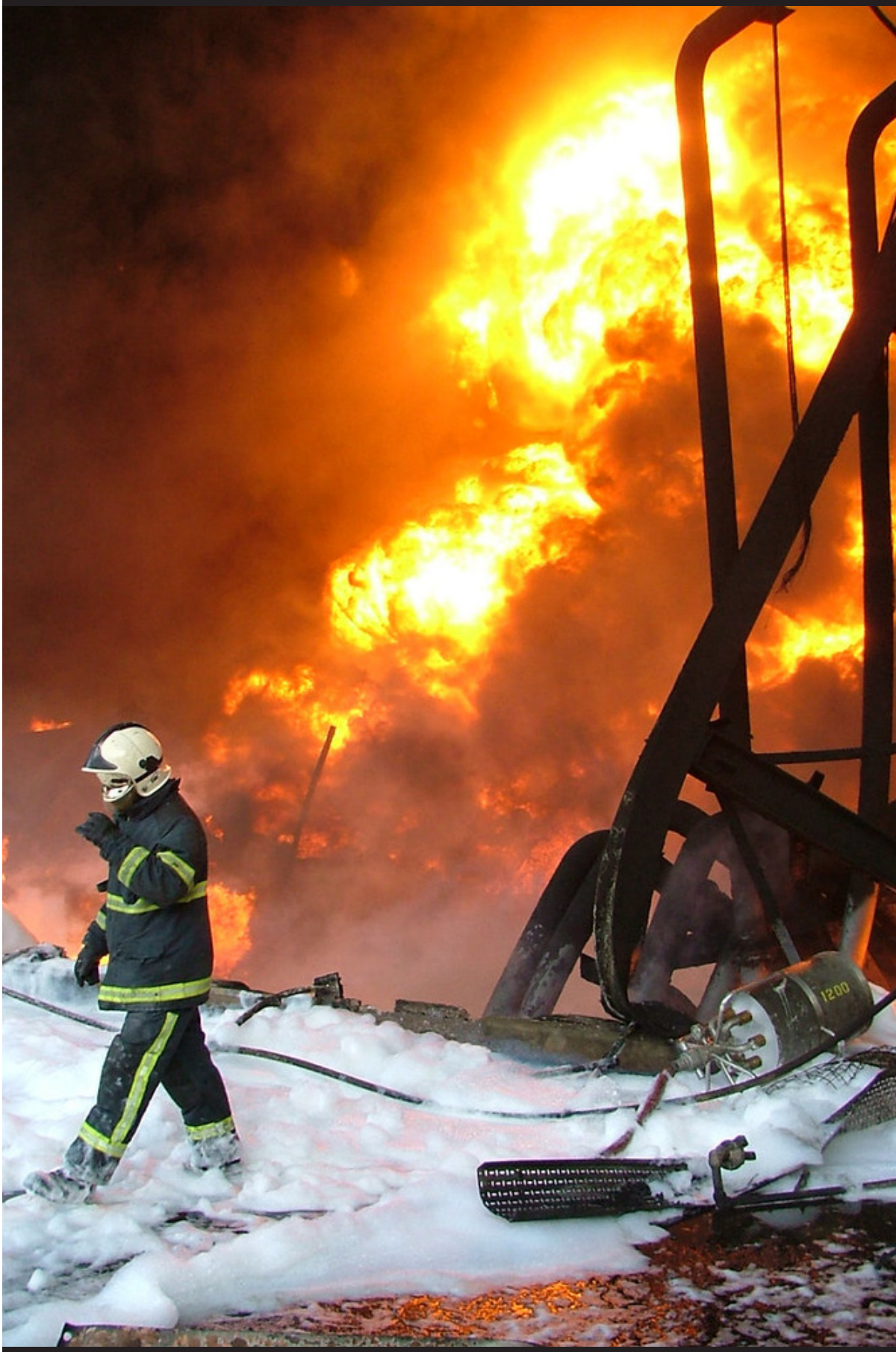
FLASHPOINT

Winter 2021



NZ INSTITUTE OF HAZARDOUS SUBSTANCES MANAGEMENT

Buncefield lessons still valid

USEFUL ORGANISATIONAL CONTACTS

NZ Institute of Hazardous Substances Management

www.nzihsm.org.nz

The official home of professionals committed to the safe management of hazardous substances and dangerous goods. The NZIHSM is a 'not for profit' industry association specialising in improving safety, health and (site) environmental performance, particularly the safe management of hazardous substances in the community.

Responsible Care NZ

Box 5557 Wellington 6145

Responsible Care NZ works with industry partners to implement the hazardous substances legislation.

WorkSafe (MBIE)

www.worksafe.govt.nz

Government agency formed to provide compliance and enforcement of hazardous substances. Responsible for hazardous substances certificates.

EPA

www.epa.govt.nz

The EPA administers the HSNO Act and supplies extensive information on working with hazardous substances.

Ministry for the Environment

www.mfe.govt.nz

The Ministry administers the HSNO Act, and provides policy, publications, technical reports and consultation documents.

HAZANZ

www.hazanz.org.nz

An association of the safety organisations in New Zealand.

Institution of Chemical Engineers

Since 1922 the multi-national IChemE has advanced chemical engineering's contribution for the benefit of society. Its offices include UK, Australia and New Zealand.

Local Government NZ

www.lgnz.co.nz/lg-sector/maps/

Local Authorities have responsibility for policing building controls. Some local authorities are contracted to Department of Labour to provide enforcement of the Hazardous Substances legislation.

President's column

Ahead at the third quarter, but our resilience is still required?

Winter has seemed a bit long and wet this year, even if our hydro-lakes are a bit low, but nothing our Sun can't fix and the joy of new life is appearing all around us. For many it has been a long winter which for some is still not over, but in spite of all this the human spirit is prevailing and no more than in New Zealand.

An early isolation strategy against the Covid virus has proved sensible so far, limiting the impact of the latest human invader. We are the lucky country, but the Covid virus will arrive, although hopefully most of us are taking advantage of the current vaccine rollout to prepare our best defences against the onslaught when it arrives.

In this Winter edition of our Flashpoint, our NZIHSM team too has a positive feeling as we deal with life's intrigues as are detailed in the articles in this magazine such as:

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Perhaps it is the continuing positive nature of many humans and the ability to think and use science to solve the tests of nature, has allowed us to work together through major obstacles. We even managed a well-planned Olympics to prove that the bug cannot defeat us!

We at the NZ Institute of Hazardous Substance Management extend our best wishes that YOU and ALL yours, and indeed our whole human race, to keep well over this testing planetary period!

John Hickey
Institute president

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Flashpoint

Flashpoint is the official journal of the NZ Institute of Hazardous Substances Management.

Editorial material does not necessarily reflect the views and opinions of the Institute.

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Illustrations are credited where we are sure of the source.

Buncefield lessons still valid

An explosion and ensuing fire devastated the Buncefield bulk oil storage depot in Hemel Hemp-stead, north-west of London, on 11 December, 2005.

While reports into the cause of this incident do not identify any new learning about major accident prevention; they do serve to reinforce some important process safety management principles surrounding the operation of bulk storage installations; and highlight the types of issues to be considered by persons charged with the responsibility of auditing such facilities for HASNO compliance.

The Buncefield site was co-owned and operated by several oil companies including BP, Shell & Chevron. Fuel was transported to the site through pipelines from outlying refineries. Various grades of fuel were separated into dedicated tanks according to the fuel type. Most fuel was then taken from the depot by road tankers. Jet aviation fuel left the site via two pipelines to Heathrow and Gatwick airports. The site was therefore of strategic importance for the distribution of fuels.

A parcel of unleaded petrol was being delivered through a feed line into an on-site tank on11 Decem-ber, 2005. The 6-million litre tank was fitted with an automatic tank gauging system that measured the rising level of fuel and displayed this on a screen in the control room. The tank was also fitted with an inde-pendent high-level switch set at a higher level than the ATG alarms – intended to stop the filling process by auto-matically closing valves on any pipelines importing product, as well as sounding an audible alarm should the petrol in the tank reach an unintended high level.

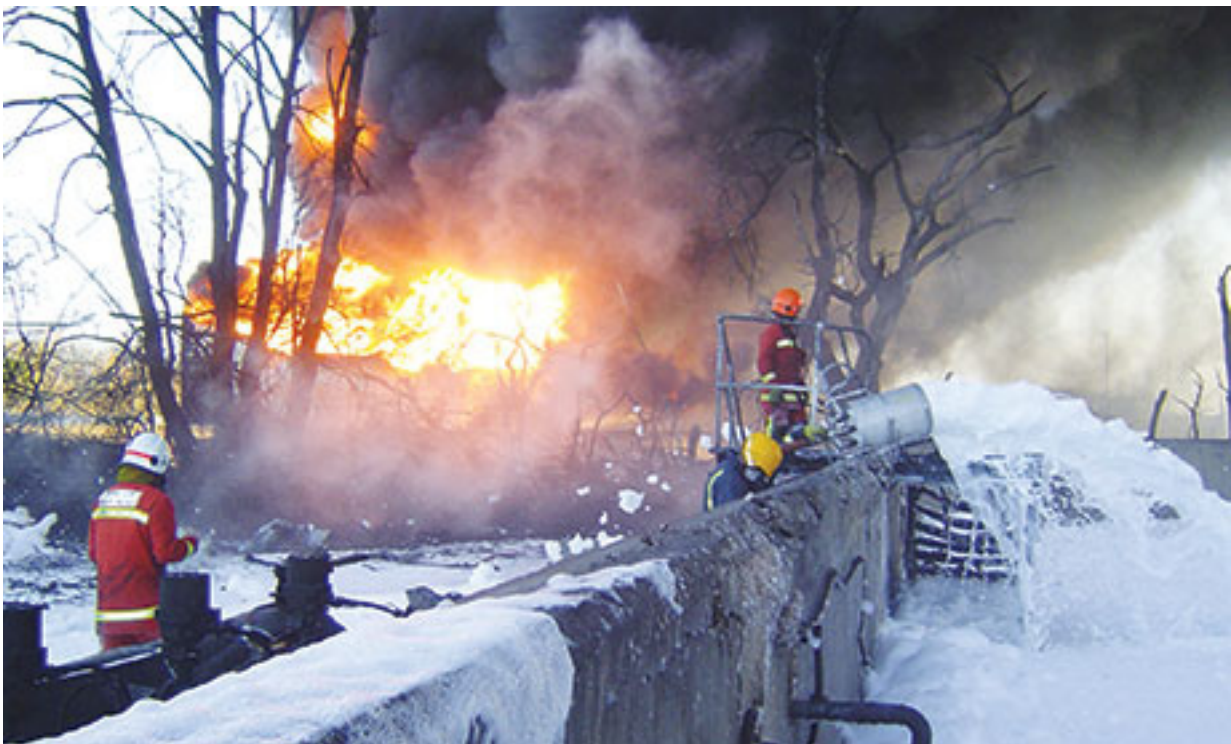
However, midway through filling the tank, the ATG display 'flat-lined', i.e. it stopped registering the rising level of fuel in the tank although the tank continued to fill. The level of petrol in the tank continued to rise unchecked. The IHLS also failed to register the rising level of petrol, so the 'final alarm' did not sound and the automatic shutdown was not activated. Due to the practice of working to alarms in the control room, the supervisor was not alerted to the fact that the tank was at risk of overfilling.

Subsequently, the level within the tank exceeded its ultimate capacity and petrol started to spill out of vents in the tank roof.

Vapour explosion

CCTV evidence showed that soon after that a white vapour was seen to emanate from the bund around the tank. In the windless conditions this vapour cloud, which was likely to have been a mixture of hydro-carbons and ice crystals, gradually spread to a diameter of about 360 metres, including areas off the Buncefield site.

The vapour cloud was noticed by members of the public off site and by tanker drivers on-site waiting to fill their vehicles. They alerted employees on site. The fire alarm button was pressed which sounded the alarm and started the firewater pump. A 'vapour cloud explosion' occurred almost immediately,



Firefighters pour foam into bund areas to prevent spread of the fire.

The low-toxic cloud from Buncefield drifted at about 3000m and eventually reached the Channel.

probably ignited by a spark caused by the firewater pump starting.

By the time the explosion occurred, over 250,000 litres of petrol had escaped from the tank. The ensuing fire engulfed many fuel tanks on the site and burned for several days. Fortunately, and incredibly, there were no fatalities, but over 40 people were injured.

Analysis results

Root cause analysis of the loss of containment revealed that:

1. The independent high-level switch had been designed so that some of its functionality could be routinely tested; but failure to release a padlock left the switch effectively inoperable after a test.
2. Failure of the ATG system arose because the system included a servo-gauge that had stuck (causing the level gauge to 'flat-line') – and not for the first time. The definitive cause of the sticking was never properly identified; and was not always logged as a problem.

Other shortcomings included:

- The supervisors relied heavily on the ATG system to control tank filling, which had only one visual display screen meaning that only one tank could be viewed at a time; so having no back-up for this critical control process was inadvisable.
- Tank mimics on the screen showed a red 'stop' emergency shutdown button. Use of this was meant to close all tank side valves. Unbeknown to a number of the supervisors, this was not working and had never been fitted into the system.
- There was no alarm in the event of inconsistencies between tank level measurements and filling data, which would have provided a way of alerting control room staff to an 'unexpected' static reading.
- For the tank fill lines, the site supervisors did not have access to any monitoring systems to tell them, independently of the ATG system (a) whether the fill lines were on or off-line, and (b) if on-line, the flow rate.
- There was no robust safe system of work in place to ensure that all supervisors controlled tank fill-ing in a consistent, safe way. Supervisors each used alarm levels in their own way; sometimes allow-ing tank levels to pass the 'high' level alarm to reduce pressure on storage space. Overfilling was hence a potentially inevitable outcome.
- Fault logging and systems to monitor the reliability of safety critical equipment were inadequate. There was also a lack of rigor between site management and its site critical services maintenance contractors.

Flaws in bunds

Loss of secondary and tertiary containment was a major issue during the Buncefield incident, caused by flaws in the site's bunds. Tank bunds were not impermeable and not fire resistant; and site catchment was unable to handle the large volumes of firewater involved in the incident. Tank bunds failed badly at the joints and walls where pipes penetrated them. The joints lacked fire resistance, which can be achieved by a metal water-stop and fire-resistant sealants. There was virtually no tertiary containment in place.

Containment systems outside the tank bunds amounted only to the site's drainage systems; which allowed large volumes of fuel, foam and firewater to leave the site. Pollutants from the fire in-cluding firefighting foam, and on-site hydrocarbons. These pollutants entered the stratum below the site potentially compromising an aquifer from which potable water was extracted.

The above failings that arose in during the Buncefield incident reflect a failing of safety management systems on the site in two primary areas:

1. An on-site procedure required that a critical parts list needed for maintenance be

critically re-viewed as a result of risk assessment. In reality the list was put together without any fundamental rationale. The procedure also report required a management of change exercise for replacing critical equipment; this appeared to have lapsed.
2. The management systems for loss of containment were inadequate. Standards for bund de-signs, maintenance and modifications were inadequate. Bunds were not treated as safety critical equipment.

The safety management system focused too closely on personal safety and lacked any real depth about the control of major hazards, particularly in relation to primary containment. There was also an apparent lack of procedures to ensure that safety management systems were actually being used.

Key lessons arising out of the Buncefield incident still pertinent today include:

- There should be a clear understanding of major accident risks and the safety critical equipment and systems designed to control them.
- There should be systems and a culture in place to detect signals of failure in safety critical equip-ment and to respond to them quickly and effectively.
- There should be effective auditing systems in place which test the quality of management systems and ensure that these systems are actually being used on the ground and are effective.

It is recommended that all working in high hazard industries should look carefully at their own operations in the light of the management and technical failings that lay behind this incident.

Likewise HASNO auditors should view clients' sites in the same context.

– Dave Lascelles

UBCO walks the talk on EVs

Tauranga-based electric motorcycle manufacturer UBCO is doing, not talking, about emissions, climate change and new propulsion systems.

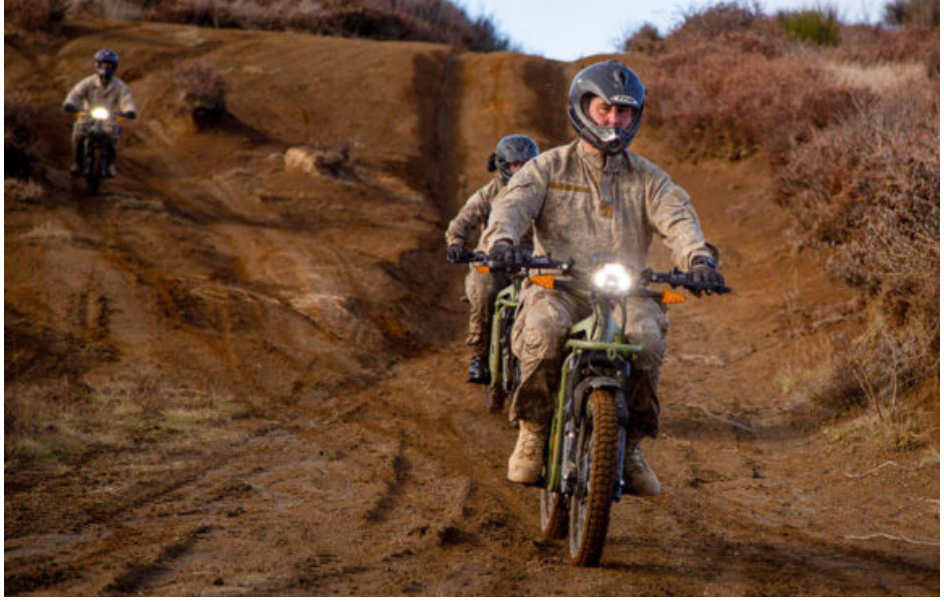
It has raised $14.16m as it sets its sights on being the number one utility electric vehicle company in the world.

UBCO manufactures electric utility vehicles, hardy bikes designed to be used in farming, conservation, freight and defence industries. The bikes come with intelligent technology that connects the fleets of vehicles, allowing users and businesses to gain insight and control into the finer details of their operating systems.

Part of the business's plans to reduce the environmental footprint of its EVs is a new approach to the end-of-life management of the bikes. UBCO offers a subscription model, so it can create a circular economy, repurposing older bikes to build the new ones. UBCO planned to use the US$10m to develop a new four-wheel off-road product and stand-alone portable power.

A farmer turned up at Fieldays, scoffed at the new-fangled electric motorcycle – now he has seven.

Production line EV batteries. Photo: *Getty Images*



NZDF has trialled the trail bike version for military use.

It is in its fifth generation of some models and is selling in North America and UK.

The company sets a good example to decision-makers of the world. Apart from the need to reduce planet-warming emissions, we need to avoid eventual blackmail on prices from petrol producers spinning out a quickly reducing resource.

Who'd be a politician. Even in little New Zealand, the two main parties are at each other's throats over the type on new transport power systems, how much and when. Naturally, each says the other is wrong.

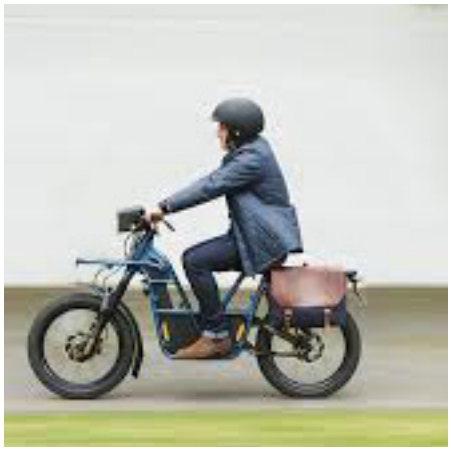
New Zealand is poised to launch a reasonable-sized bio-diesel fuel industry, but of course, there are those who want the big trucks off the road, no matter what they are powered by – electric trains are the thing!!!

The Government recently upped the ante by declaring a claim back of up to $8265 for new electric vehicles. Leaving aside the fact that electric cars are basically twice the prices of conventional cars, once a full network of pubic chargers is in place, this seems a no-brainer – electricity in, nothing out! Backing that up is a pledge to have recharge depots every 75km along main roads (and, no doubt, a lot more coffee shops).

So, more expensive for the moment to buy the actual vehicle, but officials point out that a home charge of your EV will be equivalent to 40 cents a litre!

It was immediately obvious during Covid lockdowns who is doing the polluting – the Hutt Valley during normal rush was as fresh and clear as an early Sunday morning, without hundreds of cars idly pumping exhaust fumes into the air as they waited at traffic lights.

The big unknown on electric cars is recycling of the large batteries, but at least this time we are thinking about the by-product at the same time as the development. New Zealand has BIG to deal with this – the Big Industry Group. It is a heavy hitter with 170 members members from businesses, academia and organisations, expert across energy, transport, waste and battery sectors.



Its work has been given urgency with the Government's declared intention to have 64,000 electric on the roads by the end of this year. And with a Climate Change Commission report recommending banning sale of internal combustion engine cars from 2032, "the situation is going to change for us, and radically," says BIG chair Juhi Shareef.

BIG regards end-of-use in a car as not the end-of-life for an EV battery, more a point of transition. When too exhausted to run vehicles, batteries will have enough zap left in them to warrant being repurposed as power storage units, a practice BIG sees worthy of incentive. This could become an industry in itself.

But when a battery is truly depleted, BIG foresees an accredited recycler (again, another new industry) taking over, with the Product Stewardship Organisation covering the net costs of recycling.

Two types of battery

Electric car batteries fall into two main types; the nickel hydride that is common to hybrids and newer lithium-ions needed in fully electric vehicles. A by-poduct of our continuing sophistication in technology is the ever increasing requirment for more rare metals – these need to be recovered.

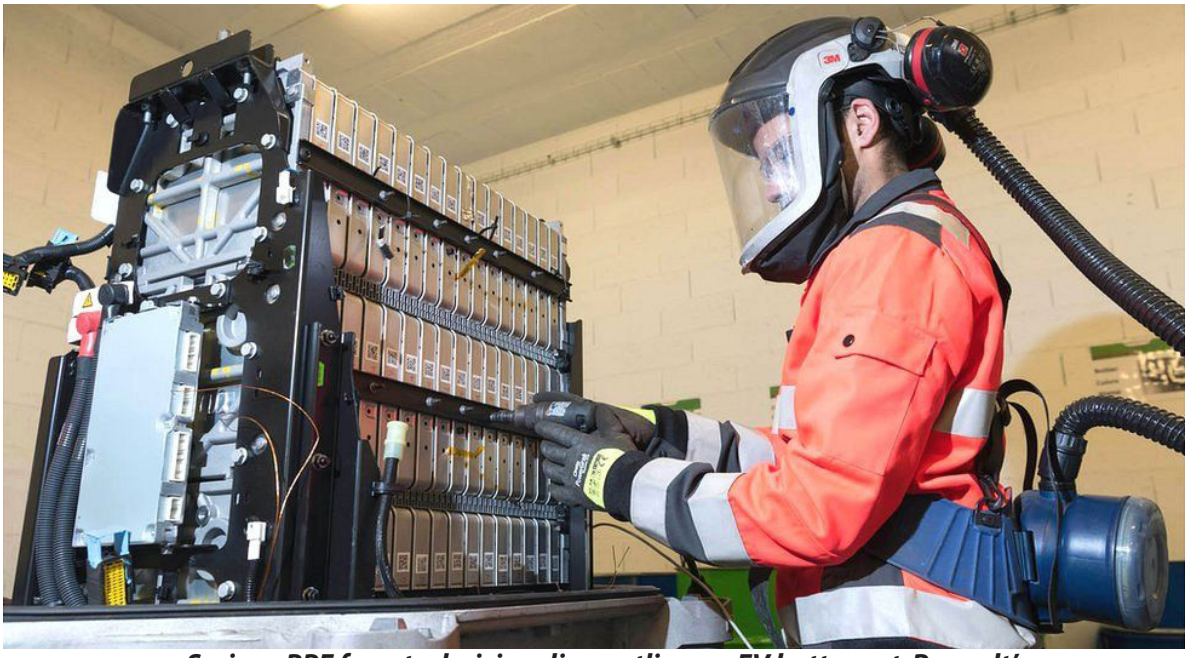
Inevitably science will need to find a way of producing the technology with more base materials or synthetics, but in the meantime the quest for more recycling goes on.

EV batteries are larger and heavier than those in regular cars and are made up of several hundred individual lithium-ion cells, all of which need dismantling. They contain hazardous materials, and have an inconvenient tendency to

explode if disassembled incorrectly.

Recent proposals from the European Union will make EV suppliers responsible for not simply dumping them at the end of their life, and manufacturers are already starting to step up to the mark.

Nissan is now reusing old batteries from its Leaf cars in the automated guided vehicles that deliver parts to workers in its factories. Volkswagen is doing the same, but has also recently opened its first recycling plant, and plans to recycle up to 3600 battery systems per year during the pilot phase.



Serious PPE for a technician dismantling an EV battery at Renault's facility.

"As a result of the recycling process, many different materials are recovered. As a first step we focus on cathode metals like cobalt, nickel, lithium and manganese," said Volkswagen's Thomas Tiedje. "Dismantled parts of the battery systems such as aluminium and copper are given into established recycling streams."

Renault, meanwhile, is now recycling all its electric car batteries – although currently, that only amounts to a couple of hundred a year. It does this through a consortium with French waste management company Veolia and Belgian chemical firm Solvay. But it is to recycle not only Renault batteries but all batteries, also including production waste from the battery manufacturing plants.

The issue is also receiving attention from scientific bodies such as the Faraday Institution, whose ReLiB project aims to optimise the recycling of EV batteries and make it as streamlined as possible. "We imagine a more efficient, more cost-effective industry in future, instead of going through some of the processes that are available - and can be scaled up now - but are not terribly efficient," says Dr Anderson, who is principal investigator for the project.

Currently, for example, much of the substance of a battery is reduced during the recycling process to what is called black mass – a mixture of lithium, manganese, cobalt and nickel - which needs further, energy-intensive processing to recover the materials in a usable form.

Manually dismantling fuel cells allows for more of these materials to be efficiently recovered, but brings problems of its own. Automation and oboics and economies of scale are the words being bandied abput by the experts.

Other driving need

The other driving need for recycling is the actual availability of the materials as we mentioned earlier. Fro example, there's a bit of lithium in Cornwall, but by and large the UK has challenges in terms of sourcing the factory materials that it needs.

From a manufacturer's point of view, therefore, recycling old batteries is the safest way to ensure a ready supply of new ones.

"We need to secure - as a manufacturer, as Europeans - the sourcing of these materials that are strategic for mobility and for the industry," says Renault's Hermine. "We don't have access to these materials outside of this recycling field - the end-of-life battery is the urban mining of Europe."

The lesson in all tnis is New Zealand need to prioitise its forming of strategic partnerships on recycling.

Maybe what we really should be working on is a black box that can plug into current motor technology and crack the hydrogen from ordinary water and burn that, leaving oxygen to be pumped out the exhaust, or remixed in a new engine design as an explosive gas reinforced by oxygen.

Last word in the discussion: Apparently the last time there was this much CO_2 in the atmosphere, Antarctica had palm trees!

– Ross Miller. Editorial manager, Flashpoint.

Sun and wind New Zealand's saviours?

Our society relies on energy.

A good energy source needs to be reliable in that it must be readily available, easily stored and obtainable and be able to be transported to its use site to provide ready energy with minimal side effects whenever it is required.

While according to the 2020 NZ Energy survey, oil still accounts for 32% of our overall energy vs 33.5% in the 2017 usage, so while the search for alternative energy technologies is gaining traction such as wind, hydro, solar and hydrogen, it is a slow process.

If we consider the 2020 vs 2017 NZ Energy survey:

This summary shows that many think of hydro and wind as the big alternatives, but hydro actually only accounts for 11% of our overall energy and in the 2020 energy survey, its quieter cousin 'geothermal' energy actually accounted for 23.3% of total energy or over 55% of electricity production.

It is interesting to note that in spite of the on-going discussion about the need for renewable energies in our quest to limit the carbon effects towards global warming, there has only been a marginal 1% movement towards renewables over the past two years. Part of this was due to the very dry conditions over our summer and also a significant reduction of 1.5% in the availability of gas for electricity production which was not able to be replaced by renewables and actually meant a significant increase in imported coal for the production of electricity.

However, the major effects in the recent period as identified in the MBIE Energy survey were:

- the renewable share for electricity was 79%, down from 81.9% this time last year;
- the country was warm and dry as New Zealand continued to be influenced by a La Niña weather pattern – with below normal rainfall, hydro generation was down 9% on the back of lower hydro lake storage levels and generators preparing for a drier than usual winter;
- lower hydro generation, coupled with a tight gas supply, saw higher coal imports to meet demand for electricity generation;
- gas production fell this quarter, down 18% since March 2020, and 7% since December 2020 – at the same time gas storage levels at Ahuroa increased (up 1 PJ since December 2020 to 6.7 PJ);
- importation of coal was 0.3

Actual Energy Use in New Zealand 2019 vs 2017

Gross petajoules (PJ)								
	2017	**% total**	**2017**	**2017**	**2020**	**% total**	**2020**	**2020**
Primary Energy Supply			***Renewable***	***Non-Renewable***			***Renewable***	***Non-Renewable***
Coal	*51.39*	5.5%		51.39	*53.76*	6.4%		53.76
Oil	312.52	33.5%		312.52	275.07	32.8%		275.07
Gas	197.61	21.2%		197.61	164.92	19.7%		164.92
Hydro	90.66	9.7%	90.66		92.07	11.0%	92.07	
Geothermal	204.48	21.9%	204.48		195.8	23.3%	195.8	
Other Renewables	73.92	7.9%	73.92		55.91	6.7%	55.91	
Electricity			*see above*			0.0%	*see above*	
Waste Heat	1.19	0.1%	1.19		1.19	0.1%	1.19	
Totals	**931.77**	**100.0%**	**370.25**	**561.52**	**838.72**	**100.0%**	**344.97**	**493.75**
Indigenous Production	712.05	76.4%			634.89	75.7%		
Imports	368.47	39.5%			358.73	42.8%		
Exports	108.66	11.7%			98.28	11.7%		
Stock Change	-26.05	-2.8%			-8.27	-1.0%		
International Transport	66.14	7.1%			65.29	7.8%		
	931.77	**100.0%**			**838.32**	**100.0%**		
Total Percentages	**100%**		**40%**	**60%**	**100%**		**41%**	**59%**

Source: MBIE Energy in New Zealand Report 2020

million tonnes imported this quarter (up 25% since March 2020, but down 21% since December 2020) – coal used for primary electricity generation more than doubled;
• industrial electricity costs rose sharply, increasing by 17% since year ended March 2020 – over the same period, residential electricity costs rose only 0.9%.

While about 21% of New Zealand's electricity comes from geothermal now, with as much electricity generated from geothermal as from fossil fuel in 2018, there is still some work to go if we are to get New Zealand to the Government target of 100% renewable electricity by 2035, and net-zero greenhouse gas emissions by 2050, Especially if the goal of mainly electric motor vehicles and the corresponding need for an increase in renewable electricity is to be achieved.

Looking at the sources of energy in the NZ annual energy usage, it is hard to see where this increase is going to be easily achieved. However, given that most of the energy in our solar system either directly or indirectly comes from our sun, and also that only 2.6% of New Zealand energy comes from solar and wind sources so far, that this is probably one area where an increase in renewable production is required!

Certifiers workforce initiative update

The HAZANZ, NZIHSM and HSPNZ initiative towards promoting an increase in the available training of compliance certifiers has been enhanced through a new arrangement with Massey University towards the training of new certifiers and increased information on the professions websites as to the role of a hazardous substance compliance certifier.

New Zealand needs more people to qualify as hazardous substance compliance certifiers to meet current and future industry demands.
Incorrect handling, storage of or exposure to hazardous substances can lead to serious adverse outcomes for the environment, and people's health and safety
We can help you qualify as a hazardous substances compliance certifier.
Hazardous substances compliance certifiers:
• issue compliance certificates confirming workplaces, workers, or equipment comply with Health and Safety (Hazardous Substances) 2017 Regulations;
• are qualified professionals, authorised by WorkSafe.

What is the job really like?
No two days will be the same as a hazardous substances compliance certifier. You'll get to meet lots of different people and travel to different locations. Within any week you can expect to be doing a whole range of tasks:
• spending time in different workplaces and observing a variety of sites;
• talking with people about an extremely wide spectrum of topics including safety and business;
• analysing reports, collating documentation, assessing the results of site inspections;
• recommending suitability towards certification;
• preparing and writing reports for clients often with a deadline;
• liaising with industry and regulators in their understanding of hazardous substance compliance;
• be a part of keeping key industries certified and operating.

Some FAQs:
What products or chemicals do hazardous substances compliance certifiers deal with?
Products or chemicals that:
- can explode;
- are flammable;
- toxic to people;
- are corrosive;
- are environmentally toxic.

What are some commonly used hazardous substances?
Commonly used hazardous substances and products include soaps, cleaners, acids, glues, disinfectants, fuels, dusts, cosmetics, petroleum, heavy metals and solvents.

What about workplaces?
Unfortunately, between 600-900 people in New Zealand die prematurely each year from work place-related disease from exposure to hazardous substances.

Employers are required to manage the storage and handling of workplace hazardous substances and to protect workers, workplace visitors, and people close by.

What about legal requirements?
Part of a compliance certifier's role is to ensure workplaces meet their legal requirements around hazardous substances by:
• creating and maintaining an inventory of hazardous substances handled at a workplace;
• maintaining a safety data sheet;

- ensuring correct controls, processes and procedures in place when hazardous substances are stored;
- ensuring people handling hazardous substances are appropriately trained;
- ensuring appropriate protective equipment has been provided to staff;
- ensuring staff are using the protective equipment provided.

What personal and other skills would I need to become a hazardous substances compliance certifier?

- Ability to communicate well: you'd be working with, and explaining sometimes complex information to, a range of different people and types of organisations, so the ability to relate to people easily, as well as flexibility and adaptability are key.
- Be an expert on the regulations: there's a lot of laws associated with hazardous substances so you would need good memory skills and a good eye for detail.
- Written skills: report writing is a key skill, as well as an ability to meet deadlines.
- Strong ethics, strongly trustworthy: you'd be dealing with complex hazardous substances so a good character and someone who cares for the well-being of others is essential.
- Existing skill base: it's not essential, but being already skilled in a trade or academic field would add value and complement a compliance certifier's work. A background in plumbing, gas fitting, electrical, engineering and construction are useful. Other useful fields of work are auditing, investigation and education.
- Be keen to develop: you'd mainly develop knowledge by training on the job and interactions with a current and experienced compliance certifier. Knowledge can also be gained through science based or a similar course in a similar manner to a science, engineering or trade professional.

What qualifications do I need to have become a hazardous substances compliance certifier?

What career and education pathways are available?

Generally, it takes around three years training to become an independent compliance site certifier.

Step 1: to start you need to have a good grasp of English, mathematics and science at a basic level at secondary school and enjoy learning these topics.

Step 2 : obtaining an undergraduate degree in science, mathematics or in engineering is typically the next step. If you don't have an undergraduate degree, you need to be able to demonstrate suitable substantive workforce experience like having an existing skill in a trade.

Step 3: The next step is becoming a trainee which usually involves becoming employed by a company. You will do both office and site work alongside an existing hazardous substance practitioner such as scientists, engineers or advanced trades.

The final step is being assessed by the government's regulatory authority WorkSafe NZ. You will be asked questions with assistance from professional bodies.

Once you are a qualified compliance certifier there are some interesting new education pathways you can take to further your expertise and interest in hazardous substances. HASANZ in-conjunction with HSPNZ, NZIHSM, Skills Organisation and Massey University, with support of WorkSafe, are developing a hazardous substances training programme. This programme is the start of a learning pathway or compliance certifiers. It is also available to those who wish to develop their hazardous substance knowledge for their workplace or professional development.

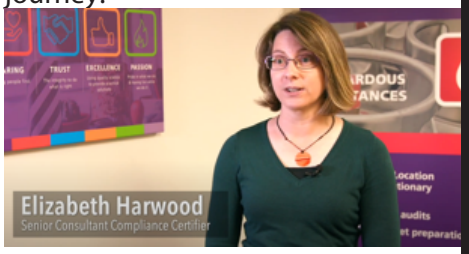
The first part of the programme is undertaking two papers at Massey University:
251.272 - Occupational Health and Safety 2 is available with a hazardous substance focus. Apply from Semester 2, June 2021.
250.318 - Special Topic - Hazardous Substances Compliance Certifier - available to apply from January 2022.

This course of learning is a great opportunity to develop hazardous substance management understanding, along with an appreciation of the requirements of compliance certifiers. Please contact Assoc Prof Ian Laird I.S.Laird@massey.ac.nz if you are interested in attending these courses.

There are more specialised courses in the pipeline available in the future which builds on the Massey University papers.

Hear what Cam has to say about being a trainee compliance certifier:

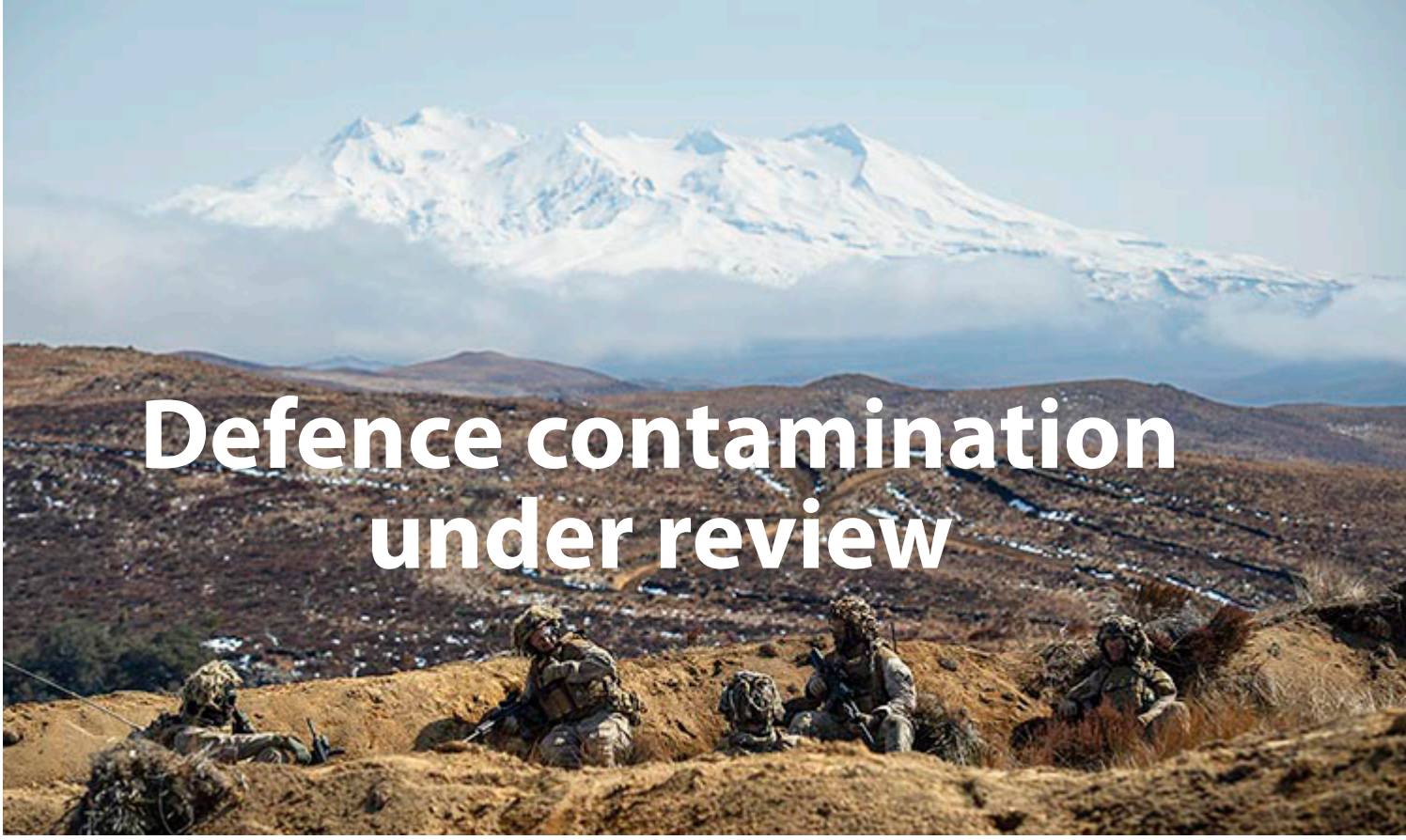
What's a career as a Compliance Certifier like – hear Elizabeth's journey:



Links to Cameron and Elizabeth can be found on http://www.hazsafe.org.nz/ads.html

Find out more about the Hazardous Substances Certifiers Initiative in general at Health and Safety Association NZ.

Find out more information about becoming a hazardous substances compliance certifier? Email office@nzihsm.org.nz or info@hspnz.co.nz



Defence contamination under review

The New Zealand Defence Force is changing its handling of ammunition to cut down the impact of accumulated heavy materials on firing ranges, on land and sea.

Every single bullet fired can leave a minute amount of a variety of metals either at point of firing, or point of impact. Over time the minute amounts add up.

Land at Waiouru has been contaminated but the Defence Force details of other firing ranges are not known. Investigations have found elevated levels of lead, copper and zinc at other firing or demolition ranges. At one site – an old tank, called "1200 Feature", a training target for 30 years – lead exceeded human health levels.

Up to 2012 the NZDF released 450 tonnes of lead and other heavy metals onto the land and at sea from training and operations. An unspecified amount was retrieved and disposed of.

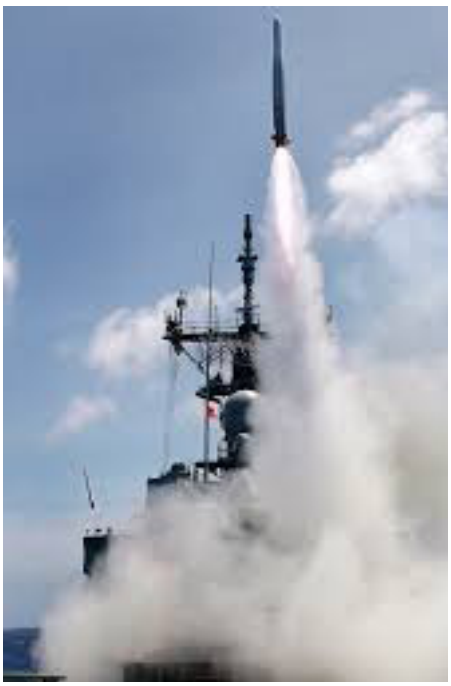
A civilian staffer who worked on destroying ammunition got lead blood poisoning in 2013 – this sparked an investigation, enhanced safety measures to reduce staff exposure and the NZDF stopped using that type of incinerator
In 2020 it bought two new ammunition combustion systems, for almost $1m.

Eight years on from the blood poisoning, it is still working on:

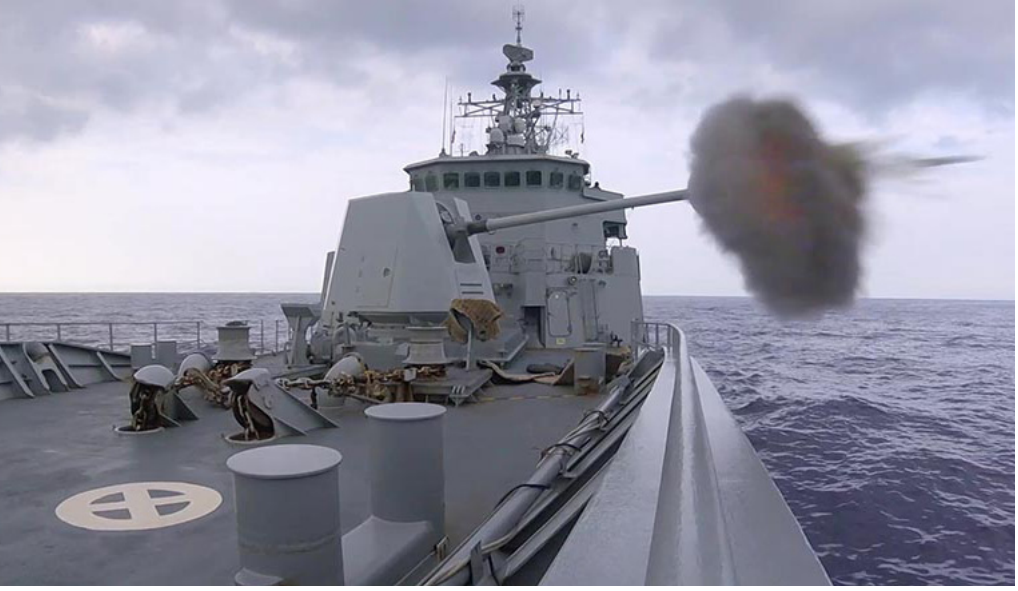
- a way of disposing of the hazardous waste produced by burning used ammunition;
- maintenance and environmental management plans for ammunition disposal sites;
- an environmental review to identify what heavy metals or hazardous chemicals ammunition contains.

In addition, ammunition supply contracts will be improved so the NZDF will know just what it is getting.

The NZDF said 22 sites with contaminated soil have been looked at, and the cost of remediating the sites - evacuating them and disposing of half the soil - is included in a $28 million



pollution

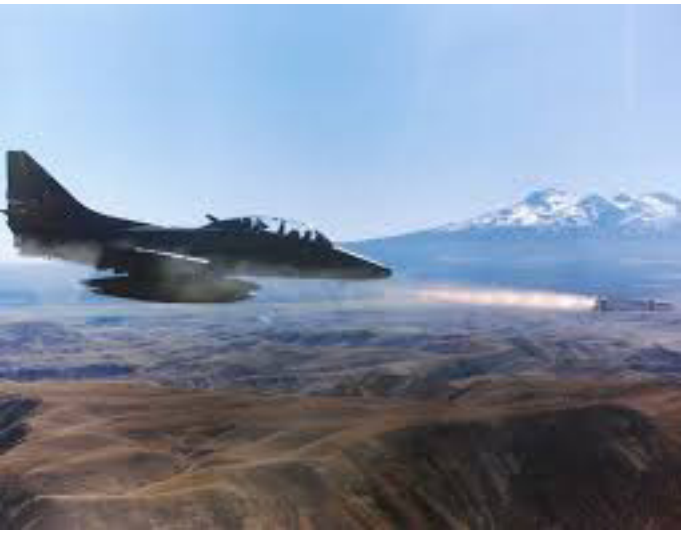


HMNZS Te Mana bares her teeth. She was the gunnery champion at 2018 RIMPAC based of Hawaii.

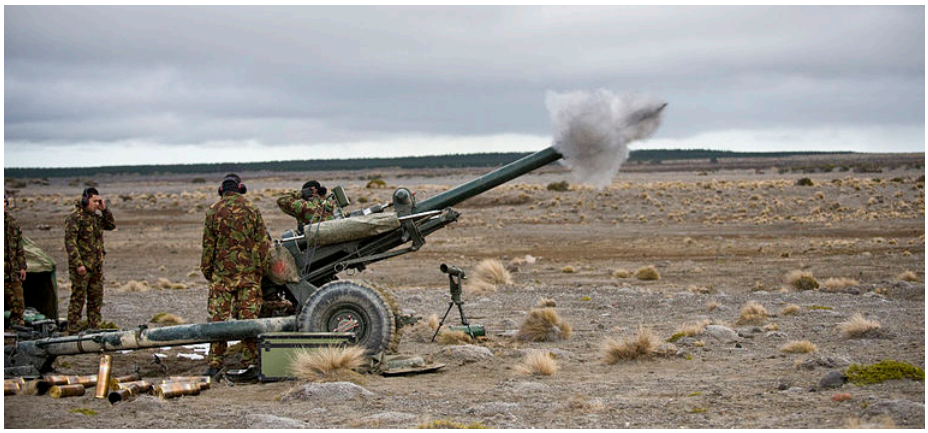
adjustment made to the value of the contaminated land and buildings. This costing does not constitute a commitment or a provision for remediation.

More than 100 sites that might still be contaminated from ammunition depots, and firing ranges dating back to the World War II, were identified in Waikato in a 2011 study for the regional council. This included 22 grenade ranges and an aircraft bombing range.

Most of the sites routinely monitored countrywide in recent years had concentrations of lead, cadmium, copper, and zinc below toxic guideline levels. However, there were spikes in zinc – a danger to marine line at multiple sites in the three main cities.



As *Flashpoint* has previously noted, the NZDF has also been grappling since 2017 with contamination from a class of chemicals called PFAs, found in firefighting foam. Its annual report said its liability for PFAs in soil and water "is not possible to quantify".



Another shell adds to the contamination at Waiouru.

Steady progress in Ruakaka clean-up

Steady progress is being made in the clean-up of a site in Northland containing hazardous waste that experts estimate will cost upwards of $3 million.

Whangārei District Council, Northland Regional Council, WorkSafe, Ministry of Environment, and the EPA are sharing the cost of cleaning up the site at Allis Bloy Pl in Ruakākā where about 800,000 litres of chemicals and 400,000 litres of bund water are stored (reported on in a previous *Flashpoint*). They were forced to take on the task after site operators Sustainable Solvents Ltd, Solvent Services NZ Ltd and Sustainable Solvents Group Ltd failed to comply with an Environment Court order to clean up the site.

The district council awarded a tender to InterGroup Ltd to evaluate the hazardous waste on site and to repackage the solvents for safe transport to a disposal or recycling facility. Six 20,000-litre chemical transfer tanks have been filled with solvents and taken off site by mid- July. Two of the tanks have been delivered to a disposal facility while the other four are in a storage facility awaiting shipment.

Drum crushing and sludge mixing has started and they will be sent to a landfill in Auckland once processed.

WDC intends to recover the clean-up costs from the site operators.

Noxious wood stockpile grows

New Zealand's on-going use of toxic agents to treat its residential and horticultural timber supplies and its inability to recycle the treated wood means about 400,000 tonnes of noxious waste is being dumped in landfills each year.

The Ministry for the Environment equates this to about 175,000 10m pine trees going to waste annually.

The root of the problem stems from the timber industry's reliance on using Chromated Copper Arsenate to treat timber. The treated timber is used in several industries, including residential construction, landscape gardening and horticulture.

Its use is especially prevalent in the wine industry with an estimated 24 million CCA-treated posts in use, but the industry is working hard on alternatives such as waste plastic poles.

Harmful to touch and classed as hazardous waste on disposal by the EPA, CCA-treated timber contains several chemicals, including the carcinogenic compound arsenic that is used to protect it from dry rot, fungal and insect infestations.

According to WorkSafe NZ, those who work with, or come into contact with treated timber, such as builders, DIY enthusiasts and vineyard workers, are advised to wear gloves when handling the wood. They should wash their hands, face and other areas of exposed skin before eating, drinking, rubbing their eyes, smoking or going to the toilet.

It also recommends the washing of exposed clothing before wearing again and to wash separately from other household clothes, bedding and towels.

The New Zealand Timber Preservation Council said CCA-treated wood is a safe and environmentally friendly material. However, Clemens Altaner, co-director of the University of Canterbury's The Wood Technology Research Centre disagreed. "That's an insult to any right-thinking people. CCA is the strongest heavy duty wood preservative that's still available and there aren't many disposable options for CCA-treated timber in NZ apart from landfill."

Burning treated timber is banned across NZ due to high levels of arsenic in the residual smoke and ash. A 2019 study carried out the Nelson District Council found air quality in the Nelson South area detected high levels of arsenic in the atmosphere and concluded that, "the arsenic was strongly associated with the solid fuel burning and is considered to be from the use of CCA-treated timber as fuel for domestic fires."

For more than a decade, CCA

preserved timber has been banned for residential builds in the US, the UK and the EU. In 2012, the Australian Government deemed it too toxic to be used on high-contact structures such as garden furniture, picnic tables, children's play equipment and even handrails. New Zealand's continued use of CCA preservatives has baffled some scientists.

With the Marlborough region alone discarding as many as 600,000 treated posts each year and as new proposals for their disposal continue to be aired and dismissed, New Zealand's stockpiles of toxic timber waste continue to grow.

What's left behind at Kawerau?

If you go down to the woods today, you may be in for a big surprise, according to environmental activists who allege Norse Skog has been hiding dumps of various pollutants in the forests that surround Kawerau and supply the base product for the Norwegian's mil.

Kawerau's Tasman paper mill has closed, and the question now is: what has been left behind.
Norse Skog has said it is aware of the environmental matters, and will meet all its obligations. However, how big a job is that? Some locals describe the large industrial site and as cesspit 66 years in the making.

Freshwater campaigner Tiipene Marr and his family used to call the river the 'black drain' - now they call it the 'brown drain." The whole Tasman site is totally contaminated," he said. Marr said in the past workers got sick from exposure to Tasman mill contaminants, and he said he watched as diggers buried chlorine-contaminated sludge in nearby forests.

The river is much cleaner than it was, though downstream from the mill, a monitoring site on State Highway 30 shows high phosphorus, ammonia and discoloration levels, in the worst quarter of monitored rivers, and in some cases worsening. The regulator, Bay of Plenty Regional Council said there is no overarching audit report and there are no specific remediation plans required.

As incredible as this sounds in this day and age, apparently there was also no over-arching audit for Tiwai Point and the Government had to pay Southland Regional Council $300,000 to come up with one for testing whatever remediation plan the smelter company eventually releases. The Marsden Point oil refinery also does not have a remediation plan in place because fuel imports look set to continue there.

At Kawerau, a process is underway to "confirm remediation plans that mitigate effects on the environment, if required", according to Bay of Plenty Regional Council compliance manager Stephen Mellor.

Norske Skog says it is not undertaking an environmental audit of part, or all, of the site, as the environmental issues across the site are well-known and are being managed in accordance with existing licence conditions. It had been completely open with prospective purchasers about the environmental obligations.

The regional council is stressing it will keep monitoring the resource consents even after the paper mill shuts. Any landfills that were closed would have to have closure plans.

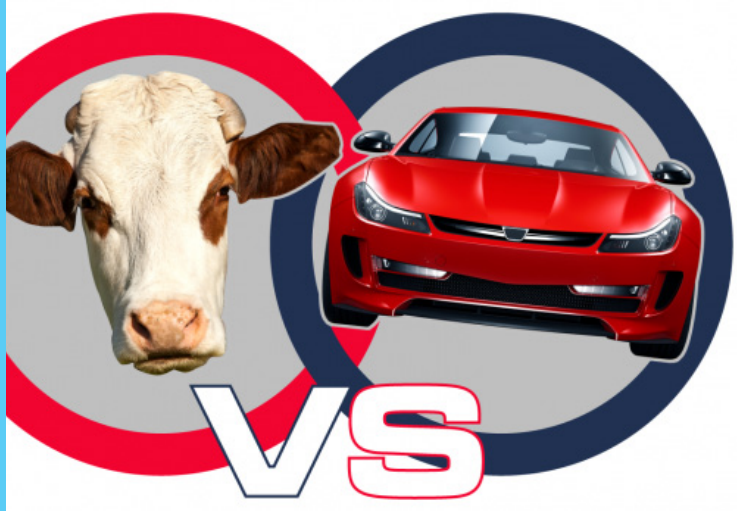
Tipene Marr is not reassured. "The resource consent doesn't make them actually clean up all their pollution", he said, such as the grey sludge buried under pylons in the forests. They won't be told to clean up all little places all over the Kawerau region where they've dumped rubbish."

Below:
The sprawling site of the now former Norse Skog paper plant in Kawerau.

Climate change - let's balance the whole process

How we produce our food, and how we get around, are two major considerations for mankind. There is widespread use of cows and cars respectively to these two ends.

It is often claimed that cows' emissions are more damaging to the climate than cars. Cows emit methane while cars emit CO_2. One cow reportedly produces CH_4 as greenhouse gas in an amount equivalent to about 4.0te pa CO_2; while one car produces about 2.7te pa CO_2. The total number of cows globally is estimated at 1.0 billion; and a similar number is estimated for passenger cars. So superficial cows would appear to be the more damaging.



However, while methane is the more potent, it is a shorter-lived greenhouse gas than CO_2, as it lasts only about a decade before breaking down, while CO_2 can stay in the atmosphere for centuries. So if we factor in the timeframe, cows are the lesser long term villain.

A whole of life cycle analysis is even more revealing. Tree planting is a worldwide thrust to take CO_2 out of the atmosphere. The same process, photosynthesis, also takes sunlight, water and CO_2 to create grass.

Cows eat grass, "upcycling" CO_2 to make meat and milk for humans, so actually reducing atmospheric CO_2 by driving regrowth of the grass to take up more CO_2 while the methane that escapes in the process breaks down in the atmosphere as noted above.

So cows actually deliver a net positive contribution to the atmosphere – holy cow!

The life cycle analysis outcome is very different for the emissions from petrol-powered cars, which deliver a negative impact on the atmosphere, with no offset like cows. In this context, even electric vehicles do not stack up if the electricity is derived from fossil fuels.

New Zealand's climate change blueprint to phase out petrol-powered cars as part of a vision to be carbon neutral by 2050 may be well-directed; but to include the dairy industry, a key pillar of the economy, in this vision, by slashing cow numbers, seems to lack scientific rationale.

The correct overall balance should permit so many cow equivalent cars and vice versa. This balance to be based on all NZ cows' cumulative ability to upcycle CO_2 in their feed, less their associated emissions expressed in CO_2 equivalents; vs all NZ cars' cumulative capacity to produce CO_2.

- Dave Lascelles

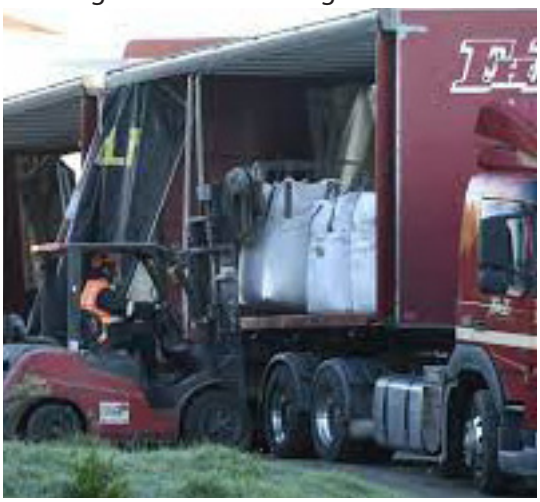
Ouvea back at Tiwai

The former Mataura Paper Mill is now empty of the ouvea premix stored there the past seven years.

NZ Aluminium Smelters' Stewart Hamilton hosted a walk through the building with guests including Gore Mayor Tracy Hicks, Mataura Community Board chairman Alan Taylor and Sort Out the Dross spokeswoman Laurel Turnbull, Who said there would be many people in Mataura who would be relieved the premix is gone.

Mayor Hicks is pleased Rio Tinto, the majority owner of Tiwai, has accepted financial responsibility and expedited removal of the substance from storage sites.

As well as the 10,000 tonnes at Mataura, now in storage in special containers at the smelter, there are about 12,000 tonnes of the premix in storage around Invercargill.



Ouvea on its way home.

Uncle Archie

Kia ora HS professionals!
We hope that you are all well and NZ appears to be the busiest for some years with the lowest rate of unemployment for years as NZ again learns to rely on our own population.

Planet priorities

Planet priority is for Planet survival while Human priorities should be for Human survival! Our team has been successful in mastering Planet resources for our survival ,but through the little Covid bug and Global warming we are slowly realising that we must work alongside the Planet to ensure our ongoing human survival.

Covid in NZ

We have been the lucky country to date out in the Pacific surrounded by a rather large ocean which is hard for a swimming bug. Still we are only now ramping up vaccines to provide some longer term defence before we open up our borders to bugs and all.

Planet warming

Meanwhile it appears that around America, Europe and the planet, the intensity of nature's storms, dramatic fires and floods appear to be increasing as our planet slowly warms shrouded by a growing carbon cloud.

Energy alternatives to minimise this greenhouse effect are being rapidly sought as we try to maximise the earth's resources while maintaining an acceptable balance.

Burning Power

One issue of warmer air is that it holds more water vapour which can mean long dry periods before larger rain deluges fall. This has been the case in NZ this year with the hydro and gas resources lower causing sub-optimal Indonesian coal being burnt for electricity supply.

Closing our oil refinery?

The closure of New Zealand's only oil refining capability at Marsden Point has been mooted where we will rely on all of our oil imports from offshore Asian markets. This could be a good idea assuming that there are never delivery interruptions such as pandemics or trade disputes. Still, we can always ride our horses or sheep.

Electric transport

Meanwhile we are pushing hard for a reduction in carbon-based transport and an adoption of electric transport. This could be a good idea provided that we can quickly find significant new renewable energy sources and infrastructure. Unless we can find a safe method of turning Einstein's mass into energy we possibly should use our Sun.

If you want to send your comment, you can send it to archie@NZIHSM.org.nz.

The ideas expressed in this column are not necessarily the views of the NZIHSM or Flashpoint and in some cases the NZIHSM frankly does not approve!

Covid comment

People are still in the middle of our current human pandemic where a little virus from nature and its offspring are causing pandemonium for the human race
What are the latest developments?

World progress

World statistics for Covid-19 infections now exceed 200 million with 4.2 million recorded deaths and numerous related conditions. Many deaths have been avoided by systematic lockdowns of infected areas to avoid the spread of the bug, however many humans are getting sick of lockdowns and awaiting full vaccination as our best line of defence against known variants.

New Zealand progress

2021 is progressing well in Aotearoa, although all around the rest of our planet the new Delta Covid virus, rapidly appears locking down our neighbours

Virus virulence

For our human team a few vaccines have now joined our fightback with the Pfizer and Astra Zeneca vaccines leading the southern charge. New Zealand is just maintaining our ban-the-bug strategy although Pacific neighbours on all sides have been hit.

Vaccine the virus

Fortunately the vaccine resistance is increasing throughout the planet with New Zealand joining a late start Pfizer with a hope that most Kiwis will 'get a jab' by Christmas.

Unfortunately as humanity will need over 90% vaccination rates to achieve the hoped for herd immunity, this bug along with the flu may be an unavoidable part of life.

Boris world

Like other interesting moves the UK is leading in its counter reaction to the virus with Boris abandoning the traditional bug isolation strategy after only 55% of the population vaccinated. It is a bold move, which does allow for some human flexibility although with a downside risk of death.

We hope that they, and indeed us all, prove to be successful.

Energy industry playing catch-up with AI

Major energy companies like BP are looking to transform themselves into digitalised businesses, while others see having a suite of smart oilfield technologies as the way to maintain their competitive edge in a US$40/bbl world.

It could be a painful journey, reports specialist journalist Elaine Maslin, and will not come overnight, but it will help drag the industry into the 21st century, cloud computing and all.

BP's Greg Hickey says a fundamental change is underway. "It is not just a downturn, it is a new business climate. Companies will have to change. There's a lot of oil around that can be produced at $40- 60/bbl and it is not going to go away. We need to be competitive.

"As a company, we are driving down cost in all aspects of our operations and in general our operations are leaner. We have fewer people than two years ago and an ongoing focus on standardising the way we do things, and elimination of non-value adding things. But, we know this traditional response is not enough.

BP launched its Field of the Future programme 15 years ago, centered on connectivity and collaboration between on- and offshore operations, fiber optic communications and advanced collaborative environments, and real-time data monitoring centers.

So, why hasn't the oil and gas industry done this before? "We didn't have the platforms to allow inter-operation," Hickey says.

"We didn't have the databases to support it. There was no cloud infrastructure to allow the software as a service model to become a more normal way of working.

"We could collect data in real time and put it in a historian and analyse it, but we couldn't really find the patterns in it once it was there," Hickey adds. Back in 1990, most of the data in the control system was in silos offshore, he says. McKinsey has said that only 1% of the data from an average 13,000 sensors offshore is used in decision-making.

"Today, we can bring data from 50,000 sensors onshore every few seconds and have industrial strength platforms to work with, like GE's Predix, to process the data and run productivity analytics."

Hickey admits that when BP implemented the Field of the Future, "the company was in a glass box," meaning that BP had wanted to keep the technology to itself. However, now it wants to change the model.

"We don't want to own digital technology and we want to move fast," he says. "We are committed to cloud computing. We are not a company that wants to own cloud solutions. We are removing the shackles to create opportunities. We want others to help. GE deliveres better capability than we can ourselves, so we can reap the benefit."

Similar attitude

Shell shares a similar attitude. "We want to change our inward arrogant attitude. We want to learn from industry and the outside world," says Johan Atema, Shell vice president. Shell has been using its data in a more explicit way inside its own business, setting targets, benchmarking unit costs, recovery from wells, etc, and making this information available across the business to help drive improved performance.

Benchmarking and improvement plans are something the firm's often more marginal downstream business is shocked that its upstream counterpart hasn't done before, Atema says. Upstream hasn't had the same need to improve as downstream has had, until recently.

Perhaps not all firms have the same vision as BP, but they're all headed in a similar direction. "Now we truly have the capability to run the Industrial Internet of Things, to ingest and analyse data, often in real time, to optimise the way we operate from reservoir to export, and soon we will be able to integrate all data," says Hickey.

NZ Institute of Hazardous Substances Management (Inc)

MEMBERSHIP APPLICATION FORM

1. **Name**: ……..
   First Name Surname

2. **Employment:**
   Business/Employer's Name: …….

   Position and Contact Details:

   Position Held: ……..

   Qualifications: ……..

   Experience in HS:
   ……

   ……

   ……

3. **Preferred mailing address: ……**

   Telephone Contacts: (Bus)…….

   Residential: ……..

   Mobile: ……..

   Email: …….. Web: …….

4. I have previously been a member of the Institute: Yes…… No ……..
   If No, I am applying to be a

   Member: ☐ Associate member: ☐

5. Return to: PO Box 10-385, The Terrace, Wellington
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