

A Revisiting Tomorrow publication

Discussion Paper 2022/03

Nuclear War: Are we prepared?

Wren Green, December 2022



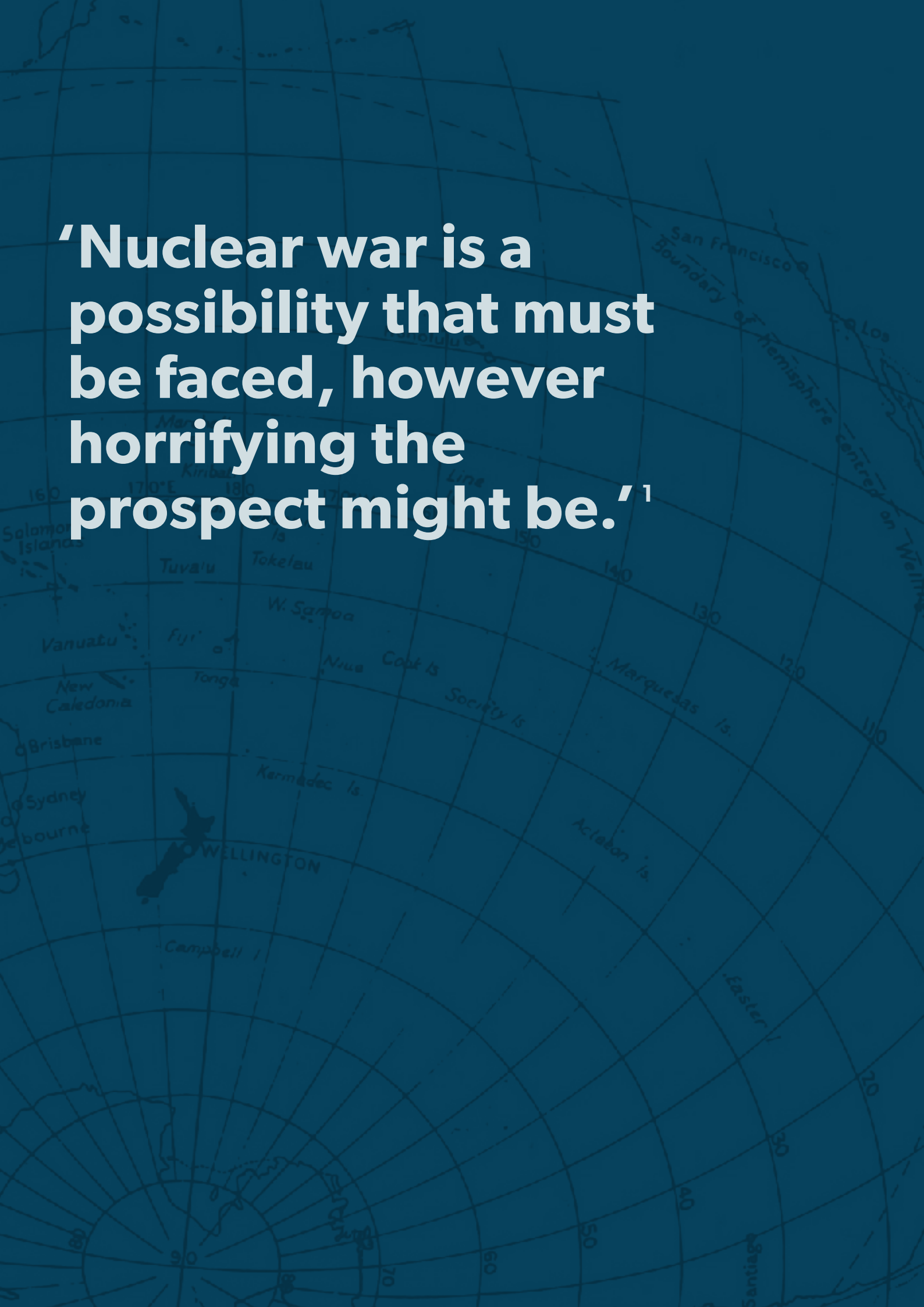
This discussion paper is a refresh of *New Zealand after Nuclear War* (August 1987). This report was published by the New Zealand Planning Council, and was authored by Wren Green, Tony Cairns and Judith Wright.

Title	<i>Discussion Paper 2022/03 – Nuclear War: Are we prepared?</i> This paper forms part of the Institute’s GlobalConflictNZ project.
Author	Wren Green
Published	Please cite this publication as: McGuinness Institute. (December 2022). <i>Discussion Paper 2022/03 – Nuclear War: Are we prepared?</i> Retrieved from mcguinnessinstitute.org/publications/discussion-papers Copyright © McGuinness Institute Limited December 2022 ISBN 978-1-99-106503-2 (paperback) ISBN 978-1-99-106504-9 (PDF) This document is available at www.mcguinnessinstitute.org and may be reproduced or cited provided the source is acknowledged.
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‘Nuclear war is a possibility that must be faced, however horrifying the prospect might be.’¹

Preface

'Black swans are large-scale, unpredictable and irregular events of massive consequence ...'

– Nassim Nicholas Taleb (*Antifragile*, 2012, p. 6)

I first raised the idea with Wren to revisit the thesis of the report *New Zealand after Nuclear War* at an event the McGuinness Institute hosted in October 2019, 'Revisiting Tomorrow'. He said he would think about it. Earlier this year, he contacted me and thought it was time. It is therefore with great pleasure that we publish Wren Green's revisit of his earlier work (with Tony Cairns and Judith Wright).

Discussion Paper 2022/03 – Nuclear War: Are we prepared? is being published 35 years after the publication of *New Zealand after Nuclear War* (1987).

The Institute always endeavours to be in spaces where others are not. We aim to explore, and ideally contribute, in areas that are on the edge, in particular 'black swan' events – the highly unlikely, but high magnitude events.

Interestingly, many of the lessons discussed in Wren's paper are not only useful in terms of a discussion on nuclear war, but would also strengthen New Zealand's global position when faced with other global crises (such as pandemics, economic depressions and climate change). It is particularly interesting to us that these commonalities exist, and that together, this type of foresight work can help us prepare for the future.

Lastly, we are particularly interested in the workshops that were hosted in 1986, and are interested in running something similar in 2023.

Thank you Wren for taking the time to revisit this important area of study. Your expertise and insights are clearly evident in this discussion paper, and are an excellent contribution to future studies in New Zealand. This paper is the first of a series that seeks out past authors of publications by the New Zealand Planning Council and the Commission for the Future and asks them to revisit and reflect on their area of study in today's context. We are calling these papers the Revisiting Tomorrow series.

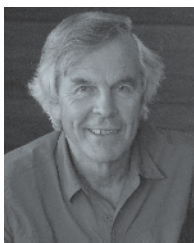
A copy of the 1977 legislation that established the New Zealand Planning Council and the Commission for the Future and a list of members of the New Zealand Planning Council and their significant publications can be found on the Institute's website under Policy Projects/Foresight/Revisiting Tomorrow series. Their contribution as a group of New Zealanders working hard to navigate our future continues to inspire me.



Wendy McGuinness

Chief Executive

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Bio: Dr Wren Green

Wren Green led a 1986 government-funded investigation into the consequences for New Zealand of nuclear war. He was lead author of a 1984 report by the NZ Ecological Society on the environmental consequences of nuclear war for New Zealand² and participated in international meetings about nuclear winter impacts. After this project investigation he was a senior manager in the Department of Conservation. He subsequently worked as a consultant across science, conservation, biosecurity and international development areas and held a range of positions in scientific and non-governmental organisations. Wren has an honours degree from Victoria University in 1967 and a PhD in ecology from the University of British Columbia as a Commonwealth Scholar.

'Luck' and the nuclear threat

Whether by cold design or ghastly accident, the perceived threat of nuclear weapons being used 'locally' and escalating into a catastrophic nuclear war has never been this high since the 1962 Cuban missile crisis. That crisis led to the Non-Proliferation Treaty (NPT) and other efforts to contain and reduce nuclear arsenals. When the tenth conference reviewing the NPT opened in August 2022, United Nations Secretary-General António Guterres said, 'humanity is just one misunderstanding, one miscalculation away from nuclear annihilation ... Luck is not a strategy. Nor is it a shield from geopolitical tensions boiling over into nuclear conflict.'³ Former Secretary-General Ban Ki-moon's warning in advance of that conference that 'through a combination of neglect, recklessness, and hubris, much of the architecture of international arms control has been degraded or abandoned in recent years'⁴ was not reassuring.

Since Hiroshima, Nagasaki and the Cuban crisis, luck has been on humanity's side.⁵ In the context of a potential nuclear war, luck is hardly a guarantee of humanity's survival. It seems more like Russian roulette, given that complex nuclear weapon systems are 'inherently prone to accidents'.⁶ Then add to this risk the near-impossible 15 minutes that the outdated, dangerous 'launch-on-warning' strategy affords the ultimate decision-makers, themselves often aging or aggressive presidents.

Global warming and its impacts are also shortening the odds of nuclear war by threatening to ignite geopolitical tensions. A 2022 analysis noted, 'There is a striking overlap between currently vulnerable states and future areas of extreme warming' – a 'dangerously underexplored topic'.⁷ Extreme heat, droughts and devastating floods caused food crises in Pakistan, India and China that may increase tensions between these three, locally belligerent, nuclear-weapons states.⁸ Computer modelling has shown that an India-Pakistan nuclear war would not only cause immense damage and deaths in both countries but the climatic effects of the smoke produced would have enormous global consequences following major drops in temperature.⁹

Thinking the unthinkable

But to 'think the unthinkable' forces the question: would a major northern-hemisphere nuclear war be survivable, and what might 'survivable' mean for us in Aotearoa New Zealand, even assuming we were not targeted?

No-one knows. We have plans and infrastructure for responding to tsunamis and catastrophic earthquakes, but not for a northern nuclear conflagration or, just as importantly, other catastrophic events. We must certainly push harder for nuclear disarmament, but is it not also important to ask the question of our survivability of nuclear war? In particular, what steps might be taken to make it more likely we would survive here?

Most of us take out fire insurance when the risk is only 0.3%, not because we expect a fire but just in case. To investigate the consequences of catastrophic events such as nuclear war for a non-combatant country seems, at the very least, a prudent and necessary undertaking.

Spur for research

In the early 1980s, the world was introduced to the 'nuclear winter' concept – that the smoke and soot arising from multiple explosions could choke off sunlight for long periods, even in regions far from the blasts.¹⁰ The disaster at the Chernobyl nuclear power plant in 1986 showed the effects of far-flung radiation over Europe. The initial nuclear-winter findings prompted an unprecedented global effort to research the physical and biological effects in detail. It concluded that the indirect effects on populations, particularly the chilling climatic effects caused by smoke, 'could be potentially more consequential globally than the direct effects, and the *risks of unprecedented consequences are great for noncombatant and combatant countries alike*' (emphasis in original).¹¹ One or more years of crop failures in freezing northern latitudes would cause a global famine. Deaths in non-combatant countries, it was estimated, would eventually exceed direct deaths from the war itself. In an effort to better understand effects, especially for non-combatant countries, national case studies were promoted.¹² Recent modelling has confirmed the devastating effects and resultant famines for six nuclear-war scenarios, even in a war only involving India and Pakistan.¹³

New Zealand nuclear study – approach

With such concerns in mind, the New Zealand Planning Council, an independent government-funded body that researched and advised governments on economic, social and cultural development (1977–91), decided in June 1986 to undertake a study into the environmental, economic and societal impacts of a major nuclear war

on New Zealand.¹⁴ The eight-month study was funded (NZ\$125,000, or \$345,000 in 2022 terms) by French reparations for the 1985 bombing of the *Rainbow Warrior*. Media interest was high. In 1987, the findings were published by the New Zealand Planning Council under the title *New Zealand after Nuclear War* (the report). It was received positively across the political spectrum (see pp. 26–28 for a selection of press coverage).

The results of the study offered a primer for policy makers to develop programmes that would foster resilience to major external shocks including nuclear war. Resilience, the ability to sustain/recover essential functions, would be the difference between a tolerable, cooperating society or social collapse and conflict.

This discussion paper summarises what was discussed in the report. Where appropriate, key weaknesses are revisited. The remainder of the paper strongly urges that the issue of preparedness must be put ‘back on the table’ where it ought to be.

Resilience, the ability to sustain/ recover essential functions, would be the difference between a tolerable, cooperating society or social collapse and conflict.

We adopted an innovative approach to investigate the very complex disruptions likely to occur within and between sectors. Given the short timeframe and limited budget, we took the risky decision to act as information brokers and did no primary research ourselves. Fortunately, this turned out to be a very successful approach. The major focus was on health, agriculture, energy, trade, transport, communications, social responses, the impacts on government and sector interactions. The unprecedented cooperation we received from experts, many public and private sector organisations and senior civil servants fully justified the decision not to do our own research. Their responses yielded valuable insights into the complexities and vulnerabilities of the key support systems we daily take for granted. We summarised their insights on how the systems might cope or fail and identified the policy issues that, if implemented, could reduce vulnerabilities and increase resilience. A market research survey also exposed the poor match between what New Zealanders

thought would be the biggest problem (radiation) and what was most likely to happen.¹⁵

The war scenario and a caveat

For the New Zealand nuclear study (the study) we first needed to ‘set the scene’ for respondents on the likely conditions that would apply in Aotearoa New Zealand. Military experts advised us separately on likely targets in this region. A summary of the main assumptions follows:

- A nuclear war occurs mainly in the northern hemisphere;
- New Zealand is not a target;
- We have little time for planning or preparation, and all trade with northern-hemisphere countries ceases for the foreseeable future;
- There is either no drop in temperature (a January [northern winter] war) or a drop of 3°C (a July [northern summer] war); and, finally,
- Either three Australian–US communication facilities are destroyed (meaning some trade with Australia might continue) or there is more widespread bombing in Australia, including a nuclear explosion 400 kilometres above eastern Australia that releases an electromagnetic pulse (EMP) also affecting New Zealand, meaning trans-Tasman trade would stop. Although an EMP explosion was considered unlikely, its effects would be devastating. The ultra-fast pulse of high voltages from a nuclear EMP can destroy electricity transmission lines, computers and communications equipment and override ordinary surge protectors. Semiconductor components are particularly at risk.¹⁶

What follows comes with an obvious caveat. Much has changed since the study but the core vulnerabilities remain and some have become worse. Our population has grown from 3.2 million people to 5.2 million.¹⁷ The report and two research papers provide more detailed analysis, particularly on policy options.¹⁸ How New Zealand would cope if it was not still reliant on a fossil-fuel economy is an important question for future research.

Tangibles and intangibles

The ‘tangibles’ were the material impacts on the key systems we investigated – food, energy, health, communications and transport. Respondents detailed the immediate crises they foresaw in their subject area, and likely problems the country would face in that area six months later and longer term, as well as alternative systems that might be developed post-war, and feasible pre-war actions to reduce post-war disruptions.

The ‘intangibles’ were much more subtle and probably more important for ‘survivability’ as a country. ‘Normal’ functioning by citizens or government couldn’t be assumed. How would we collectively respond to the grief, fear, panic, sense of pervasive loss, and shattering of so much meaning and purpose? In COVID terms, how well would the ‘Team of Five Million’ hold together? How bad would the splintering be? The initial nuclear study worked through insightful replies but many outcomes would be possible.

Fallout fears

Before summarising the main findings of the report it is important to briefly cover the one topic that New Zealanders fear the most after a distant nuclear war, namely the threat of fallout. In the northern hemisphere, where the majority of the explosions are most likely to occur, ionising radiation or radioactive fallout would kill millions of people immediately and condemn millions more to illness and death over weeks to years. Most of our information about nuclear war comes from northern

hemisphere sources; those horrifying images of fallout deaths have dominated our perceptions. But how much of that fallout would actually reach New Zealand and what would be the most likely impacts on our health?

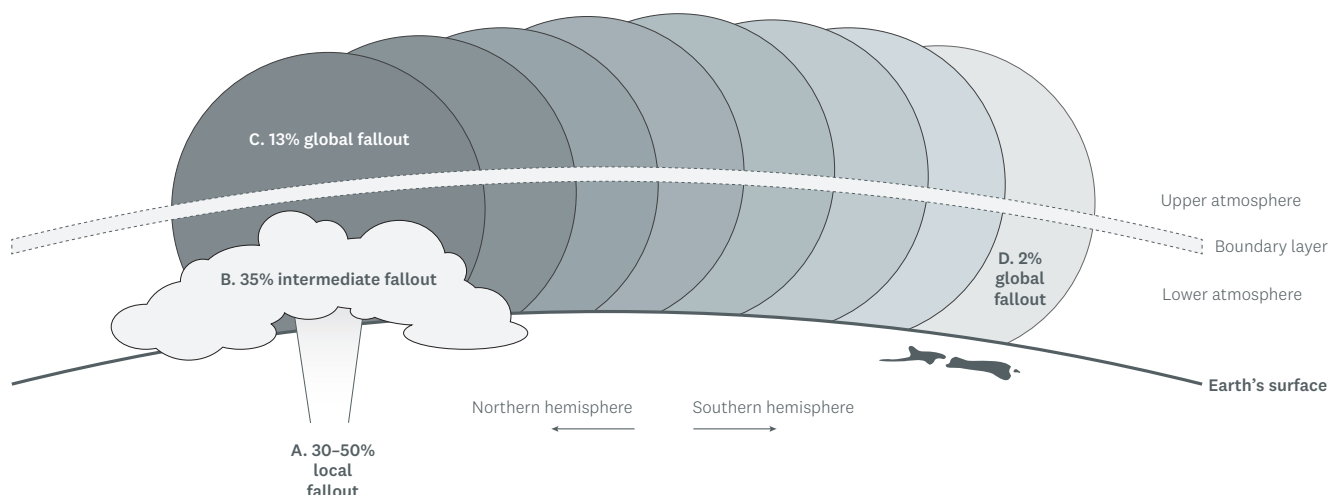
The radioactivity in material produced by nuclear explosions decreases over time and at very different rates for different elements. The intense heat of the explosion produces over 300 radioactive products from some 36 different elements. Many of those would decay and lose their radioactivity in seconds, while the slowest to decay, plutonium-239, would persist for thousands of years. Four radioactive products can cause cancers – iodine, cesium, strontium and plutonium. They have very different decay rates measured as ‘half-lives’, i.e. the time taken for half of the original radioactivity to decay. Thus radioactive iodine-131, which concentrates in the thyroid, has a half-life of eight days compared to 28 years for strontium-90 and 30 years for cesium-137.

Given New Zealand’s southern location we would receive only about 2% of the global fallout that eventually sinks in cold air masses to reach the ground in rain.

Types of fallout are categorised depending on the distance travelled from the explosion. Early or local fallout consists of the larger, heavier radioactive particles that return to earth within 48 hours of the explosion. This accounts for about 30% to 50% of all fallout from nuclear weapons exploded at ground level. Smaller radioactive

Figure 1: Approximate distribution of radioactive fallout from northern hemisphere explosions

Source: Adapted from Figure 4, *New Zealand after Nuclear War*, 1987, p. 36.



particles are lofted higher into the atmosphere and make up the remainder, called delayed fallout. This delayed fallout splits into two types depending on how high and far the particles travel.

Intermediate fallout stays within the lower atmosphere to fall back to earth in rain or is pulled down by gravity within a few weeks. Intermediate fallout stays within the same hemisphere as its origin and accounts for about 35% of all fallout.

The remaining fallout is called global fallout and is about 13% of the total fallout. This is made up of very small and light particles that are carried high into the upper atmosphere where they can remain for months or years, circling the globe, but also decaying at the same time.¹⁹

Only some of the global fallout would reach New Zealand, and no local or intermediate fallout from northern nuclear explosions. Given New Zealand's southern location we would receive only about 2% of the global fallout that eventually sinks in cold air masses to reach the ground in rain. The impact of that global fallout here is best assessed by considering the estimates of accumulated extra fallout New Zealand would receive over a 50-year period. One way of measuring this is in terms of 'rem', which is the dose measure used to estimate the potential health impacts when the energy of ionising radiation is absorbed by sensitive tissue in the human body. For New Zealand, expert estimates provided for the study were for a total global fallout of about 0.8 rem per person over 50 years with half of that falling in the first 10 to 15 years. Radioactive cesium-137 would be the main source. A further dose of 1 rem would be accumulated from diet via the food chain (cesium-137 and strontium-90) over 50 years. This total dose of about 2 rem per person over 50 years from global fallout needs to be compared to the much larger amount (10 rem) which people would receive over the same period from natural background radiation (rocks, space and technological sources).²⁰

This small extra dose of radiation would lead to a slight increase in cancers and cancer deaths. Given the high normal rates of various cancers these extra deaths over 70 years would be undetectable.

Two other fallout scenarios were also considered.

The study, on advice from military experts, included a pessimistic assumption that 15 megatons of warheads were exploded in the southern hemisphere. The extra fallout on New Zealand would add another 0.2 to 0.6 rems exposure per person over 50 years. The total of up

to 2.6 rems would still be about a quarter of the natural background radiation over the same period and have a small impact on subsequent numbers of cancer deaths.

The second scenario was for a likely worst-case of three megatons of bombs in total exploded on Australia (the equivalent of 200 Hiroshima-sized bombs). A likely maximum of 40% of the intermediate fallout could reach New Zealand. Gravity would pull some fallout into the Tasman and the rest was assumed to be spread evenly over the whole country by rain, although some would drift on across the Pacific. Non-iodine-related doses would add another 0.45 rems over 50 years, again having little impact on total cancer deaths over this period. Cancers caused by iodine-131, however, could be a greater problem. Iodine-131 is the dominant radioactive element for the first two months before it decays. It would fall on pasture, be eaten by cows, and then contaminate milk, butter and cheese products. It localises in the thyroid and under this scenario the short-term thyroid dose could be as much as 15 rem. Without protective measures the resulting thyroid disorders would be about 650 fatal cancers (for today's population of almost 5.2 million) and about 5800 non-fatal cancers. These would appear between 10 and 40 years later. These potential thyroid cancers could be substantially reduced if only pre-war stocks of dried milk powder and cheese were used for two to three months immediately following the nuclear explosions. By then, very little radioactive iodine-131 would remain. Another option would be to distribute potassium iodate tablets which, if taken pre-fallout, would stop iodine-131 from being absorbed by the thyroid gland. At the time of the study stocks of these tablets would have been insufficient to meet a nationwide demand and since all stocks were then held in bulk storage in Wellington distribution problems would have been likely. The current situation is not known.

In summary, 46% of respondents to the market research done for the study thought that fallout would be the most serious consequence for New Zealand of nuclear war.²¹ Our analysis, backed up by a subsequent Law Commission study, showed that this would not be the case. It is the social and economic impacts that could be devastating. These are elaborated on in the following sections.

Trade dependence

Only 4% of respondents to the survey on nuclear impacts identified ‘loss of trade’ as a ‘most serious consequence’.²² However, abrupt loss of northern-hemisphere trade would have immediate and long-term devastating impacts throughout all sectors of the economy and affect everyone in New Zealand. Our reliance on imports is overwhelming. In 1986, over 80% of trade was with northern-hemisphere countries, and 17% with Australia.²³ Simple estimates suggested the loss of northern import and export markets could have immediately reduced employment by 40–50%.

Abrupt loss of northern-hemisphere trade would have immediate and long-term devastating impacts throughout all sectors of the economy and affect everyone in New Zealand.

We depend on key imports such as all lubricating oils, ball bearings and motors, vehicles, medicines and machinery, plus a huge range of spare parts, building supplies and industrial raw materials. Our ability to substitute, recycle and replace such items would be severely limited given current capacities. Limitations could be improved in strategic areas, however, by supporting and developing appropriate industries. Today, we would add smart phones, laptops and many other sophisticated technologies to the list of dependent imports. There were no strategies in place for rationing and allocation systems to cover essential goods, nor have subsequent governments in New Zealand developed strategic stockpiles of important minerals. In 1986, for example, France, the US, Britain, Japan, Sweden, Italy and Spain had stockpiles to protect against disruption of supply. The US was then maintaining sufficient stocks of 94 minerals to keep US industry going for up to three years.²⁴

Our ability to substitute, recycle and replace such items would be severely limited given current capacities. Limitations could be improved in strategic areas, however, by supporting and developing appropriate industries.

So wedded is our economy to external trade that its loss would be pervasive and fundamental. It would quickly spill over into the financial sector, affecting banks and

the stock market, disrupting prices as assets and goods changed value overnight. There would be a cascade of effects in the financial sector that might have been less disruptive with the benefit of pre-planning for the initial crisis period and beyond.

Health

Loss of trade would cripple health care. Our medical supplies and pharmaceuticals in 1986, e.g. antibiotics, painkillers, dental supplies, anaesthetics, contraceptives, laboratory chemicals and medical equipment, were almost 100% dependent on imports.²⁵ What pharmaceuticals are manufactured here used active ingredients imported from the northern hemisphere. Without rationing most pharmaceuticals would have run out in three to six months; they might have lasted two years with effective rationing. The loss of imported insulin alone without alternative local supply would have killed over 6000 severe diabetics within the first year.²⁶ This would be five times the number of extra fatalities from cancers caused by radiation fallout.

By 2022 the number of New Zealand-based pharmaceutical companies had grown substantially since 1986.²⁷ They are mostly involved in producing nutraceuticals, supplements and animal health products or provide packaging, diagnostics, product development, pharmaceutical distribution and medicinal cannabis. Some pain relief medicines are also made here now. More detailed enquiries would be needed to find out if this expanding sector could meet a national demand for essential medicines (antibiotics, anaesthetics, preoperative medicines, pain relief and palliative care, antidotes, blood medications, cardiovascular medications, etc) should the need arise.

Our health is dependent, however, on much more than medicines. It also relies on essentials such as clean water, operating sewerage systems, refuse collection, and a healthy diet. Removing wastes from cities relies on engineering infrastructure, electricity, fuel, transport and a workforce that might opt to put personal and family needs ahead of collecting rubbish. As people’s health declined and medicines ran out, infectious and chronic diseases would spread and new ones such as plague and cholera could arrive later with refugees. Hospital functions would be steadily run down, intensive care facilities would cease and only a limited range of conditions could be operated on. Dental care would become very basic.

A collapse of the health system and spread of lethal diseases would further weaken the social structure and reduce the resilience of communities. However, by cooperating, New Zealand's expanded pharmaceutical industry might develop the capacity to produce enough of the medicines on the World Health Organization's (WHO's) list of essential medicines to meet national needs after existing supplies ran out. The big unknown is how reliant they would still be on raw materials, key equipment and spare parts sourced from overseas. This would most likely require a policy decision to stockpile enough of the active ingredients to last for, say, five years. Pre-war planning would need to include the development of lists of essential medical equipment, hard copies of manufacturing processes, inventories of supplies and evaluation of the feasibility of stockpiling active ingredients, essential equipment and spare parts.

Energy and transport

Our society runs on energy, still mostly fossil fuel (oil and gas), with electricity that is predominantly from renewable sources. How these supplies would be affected by nuclear war would be central to our survival. Electricity is primarily supplied by hydro (75% in 1986) and thermal power stations (then 20%) that burn local gas and coal (some imported).²⁸ Solar (under 1%) and wind (5%) currently make minor but growing contributions to our electricity supplies. The electricity grid is robust and experts told us in 1986 it should continue for the first year or so without major problems. We are fortunate in having around 40% of total energy supply coming from renewables as of 2022.²⁹

The loss of many export industries (e.g. aluminium smelter, dairy products, pulp mills) would reduce demand for electricity, so the thermal stations could be wound back to conserve valuable supplies of natural gas and fuel oil. Then as breakdowns occurred and spare parts were used up, future operations would depend on the skills of local engineering firms to recycle, repair and substitute. Eventually the Cook Strait power cables would fail and as they are effectively irreparable, North Island populations would lose a significant amount of electricity supply from the South.

New Zealand's recovery options have been seriously eroded since 1986, assuming dependence still on fossil fuels. Our report documented reduced continuation of processed fuels (diesel, petrol, aviation fuel) from the Marsden Point oil refinery, petrol from the Motunui synthetic petrol plant and extensive natural gas supplies

from the Māui gas field.³⁰ Experts advised how these facilities could continue providing fuels for months or years, depending on the functioning of equipment and capacity to make repairs. Loss of electricity supplies or an EMP, however, would render them inoperable. Natural gas sources are now much reduced, and in 1997 the synthetic petrol plant was switched to making only methanol for export to Asia.³¹ (Methanol, despite drawbacks, can be used as a fuel for cars, trucks, buses and ships, suggesting a local use for this product after nuclear war, if the ability to do so was planned for in advance.) Oil refining at Marsden Point ceased in April 2022 with the owner citing profitability concerns (over its strategic importance) and it became an import-only terminal.³² Several fields in Taranaki do produce high-quality crude oil that is all sold overseas.

As well as a near-total reliance now on imports for all fuels (i.e. diesel, petrol, aviation), the onshore fuel stocks that would be available in the case of a major disruption are much lower than in most European countries. It has been argued that we should hold at least 40 days' stock onshore in case of a 'severe import disruption'.³³ Yet in November 2022, the government announced that onshore facilities would be required to hold minimum levels of just 28, 24 and 21 days' worth of petrol, jet fuel and diesel respectively with government to also procure an additional seven days of diesel storage.³⁴ These are only slight increases over previous levels. In response, the CEO of the National Road Carriers (NRC), Justin Tighe-Umbers, sounded a warning: 'Ninety-three per cent of our goods are delivered via diesel trucks, including the critical exports that pay our way such as dairy, logging and agriculture ... New Zealand is almost entirely dependent on international shipping for our ground fuels, and there is no guarantee we won't face more supply chain disruptions or shipping lane volatility in the near term as global instability rises in north Asia and Europe.'³⁵

New Zealand, like many other countries, is part of the International Energy Agency (IEA) agreement for energy security to hold oil stocks equivalent to at least 90 days of net oil imports. With such low levels actually held onshore in New Zealand, government is taking an extraordinary gamble that in the event of a major international disruption the other 60-plus days of crucial fuel supplies would still be available and delivered from overseas contracts, all in northern hemisphere countries.³⁶

Diesel is the key fuel in food production and processing, road transport, coastal and overseas shipping, rail, mining, manufacture, forestry and a wide range of other minor uses.

If trade with the northern hemisphere is cut, fuel supply shipments are likely to be limited and even shipments of crude would be scarce, with the required tankers also a scarcity. There is a risk that New Zealand would need to rely heavily on its own petroleum resources. One insurance policy would be to recommission and hold on standby the Marsden Point refinery so it could refine the light crude oil from Taranaki – which could meet about 15% of our current demands. With post-war rationing and strategic allocation, this source could be key to maintaining vital fuel supplies for essential services across industries, including fishing, and transport, particularly for food distribution.³⁷ Diesel is the key fuel in food production and processing, road transport, coastal and overseas shipping, rail, mining, manufacture, forestry and a wide range of other minor uses. Petrol is mainly used for household transport and business vehicles.

Increasing the electrification of the vehicle fleet to help slow global warming also increases the resilience of our transport system if fuel supplies are suddenly disrupted. New Zealand will need a much higher percentage of its vehicles running on electricity before the Marsden Point refinery and more fuel storage capacity as vital backup ‘insurances’ are no longer needed.

Agriculture

Computer models gave estimates of the consequences of temperature drops on pasture and crop growths from nuclear winter impacts. A 3°C drop or less would increase frost periods, threaten many frost-sensitive crops, particularly wheat, and reduce pasture production.³⁸ Nonetheless, the risks of starvation were assessed as low given the huge surplus of agriculture production over local consumption in New Zealand.

These temporary climatic impacts would be, however, the minor problems facing agriculture. With the loss of export markets much of the livestock on farms would switch from being an asset to a liability. Rural economies would be massively disrupted. The loss of imported seeds for many vegetables, plus fertilisers, trace elements, animal antibiotics, pesticides, herbicides

and fungicides, would be felt over later months and years. In 1986, animal vaccines made here depended on imported amino acids and vitamins.³⁹ The decay of strict vaccination programmes would most likely lead to cross-infection of people from animal diseases such as leptospirosis, tetanus, tuberculosis and others. Overriding all these issues would be the availability of fuel to run farm machinery and rural transport, which, at present, is still mostly diesel. Electricity would be needed for milking sheds, electric fences, irrigation pumps, shearing and other uses.

Off-farm problems would appear quickly. Our major cities have only two to three days’ supplies of fresh vegetables, and few urban and city-dwelling New Zealanders (currently 84%) are self-sufficient in food. If fuel is scarce, food supplies to cities from farms and food processors could become erratic – assuming essential workers turn up for work and normal commerce functions in the chaos of the first days and weeks. There could be an unplanned (possibly chaotic) migration to rural areas from cities as jobs were lost and food scarcity became serious.

Reorienting agriculture production to suit domestic needs after nuclear war would be difficult and more so with no prior planning in place. The survival of food-processing businesses might depend on how well prepared they were for major disruptions. ‘Scaling-down’ would be a challenge for the dairy industry, but 1986 informants said this could be helped with cooperative planning and research in advance.⁴⁰ Issues would include adapting to local energy supplies and identifying factories that could be adapted to produce other products. One option would be to reorient dairy waste products, such as whey, to make chemicals. Whey can be turned into some antibiotics, as well as methanol, ethanol, propanol, butanol, acetone and lactic acid. Acrylonitrile is another potential product that might provide the basic feedstock for a plastics industry. Pre-disaster analysis would need to document production systems, work out stockpiling requirements of essential materials and identify potentially useful facilities.

Communications

This is where the tangibles and the intangibles collide most dramatically. In 1986 the tangibles about the nature and resilience of our communications systems were about maintaining radio services, ink supplies for newspapers, and spare parts supplies that would last for two to five years. Experts in telephone and radio systems told us communication systems would degrade over months and years.⁴¹

Those tangibles from 1986 are now completely out of date in 2022. Now our communications are the internet, cloud computing and data storage, and near-total reliance on mobile phones rather than fixed line systems.

Today, five fibre-optic submarine cables connect us to the United States and Australia for virtually all overseas communications. Satellite capacity is very limited and would be swamped if these cables stopped functioning. Those same cables carry almost all our internet traffic, including our emails as well as online banking, private sector data, eftpos transactions, health data, Zoom calls, etc, and link us to cloud computing and data storage which is effectively 100% offshore in US computing facilities.⁴² New Zealand government agencies are increasingly moving their information and services into public cloud services.^{43, 44} The leading providers of these services are US corporations Google, Microsoft and Amazon.⁴⁵ The operational control of these facilities is in the US and will always remain so, even when these companies have data centres in New Zealand.⁴⁶

Failure of this very complex, interlinked system, which would most likely happen first at the US end, would render us blind, dumb, ignorant and partially helpless with respect to electronic information and communications. And probably very afraid. Google gone, eftpos down, how do we buy things? Using cash for all purchases or cheques for payments is no longer part of our modern economy.

Failure of this very complex, interlinked system, which would most likely happen first at the US end, would render us blind, dumb, ignorant and partially helpless with respect to electronic information and communications.

The intangibles of this are how people and government (also potentially without vital information and lacking most communication options inside or outside the country) would respond given this scenario. Perhaps there might be a few days before these systems all crashed, or perhaps not.⁴⁷ Either way, a government reacting without robust and tested strategies to deal with such contingencies is less likely to make sensible decisions under those circumstances. A special working party established for the study, including two top-level public servants, considered this issue and concluded, 'Given the present lack of preparedness these decisions would be difficult to resolve, let alone implement, and

probably impossible if there was widespread overloading or prolonged collapse of communications.'⁴⁸

What continues to remain absolutely relevant is the vital importance of effective communications during national crises. The 2020 outbreak of the COVID-19 pandemic showed the paramount importance of communicating clear and accurate information to the public. For the study we assumed the Prime Minister would be on radio and TV to reassure and appeal for calm, while Police, Defence and Civil Defence would be in urgent communication over rationing directives, radiation monitoring, etc.⁴⁹

What continues to remain absolutely relevant is the vital importance of effective communications during national crises.

Now, but not in 1986, we have a strategic weakness: our near-total reliance on extremely complex, vulnerable, electronic communication systems linked to and owned and controlled by US multinationals.

People and government responses

In 1986 the team interviewed a wide range of people including senior officials on how people and government might respond. Faced with a disaster, people have two primary concerns: ensuring family members are safe and finding out what has happened. To make sense of disasters people urgently seek immediate and detailed information about its nature and scope, secondary threats and emergency needs. In short, they need to reduce uncertainty, using accurate information (however dire), then decide on their appropriate response. In Europe after the Chernobyl explosion, confusing and contradictory information about radiation levels caused general panic in several countries, fear was widespread, supermarkets and chemists were raided and support for local and national authorities was seriously eroded.⁵⁰ People respond to technological disasters (e.g. chemical spills, power plant accidents), for which they have little or no prior experience, in more unpredictable and fearful ways than they do to natural disasters. Undetectable threats, such as radiation, heighten those fears and cause even more panic. The accident at the Three Mile Island nuclear power plant (1979) in Pennsylvania left people depressed, frightened and mistrustful of inept leadership and confusing information from the power company.⁵¹

Lengthy pre-war tensions might lead some people to prepare and government to take a number of measures, such as publicising steps it would take if it became necessary, e.g. rationing fuel. This might, in turn, lead to a panicked rush to stock up on fuel and other essentials and disrupt normal supplies. When nuclear war did happen there would be severe psychological shocks of grief, loss and dislocation. Those with relatives and friends overseas would be desperate for news that was unlikely to come. There would be panic about possible nuclear explosions in New Zealand, along with profound disorientation and loss of all that was 'normal'. Shop owners and retail staff we spoke to in 1986 said they would probably lock their shops and go home. Many spoke of immediately travelling to unite families but that might clash with initiatives that government (Cabinet) might decide to take (see Box 1).

Box 1: Role playing the impact of nuclear war

A big question for the project team was 'What's the likely response of citizens and government in the critical first days after nuclear war happens?' Everyone would be in a state of shock, fearful and uncertain about what might happen next and what they should do for their own safety and survival. Nothing would have immediately changed around them, but everything would have changed. Psychologically battered citizens would be trying to make important decisions, and so would an unprepared government, represented in this case by Cabinet, needing to take quick strategic decisions in the national interest.

Social scientists we consulted focused on a particular concern – in those first days of confusion and panic, would citizens and government be 'on the same page' or not? Because if they weren't, then the unravelling of trust and social cohesion could be swift, long lasting and very destructive. To explore this question we worked with expert facilitators and devised a role play to see if we could gain any insights into how this dynamic between citizens and authority (as represented by 'Cabinet') might play out. We did it a few times with different groups of volunteers (from a cross-section of society) and the outcomes were always the same, unanticipated, and very revealing.

The role play was structured as follows. The participants, a group of about 15 to 20, were randomly assigned to a group called 'Community' or one called 'Cabinet'. All participants were briefed together on the scenario they were suddenly 'living in', namely that a major northern nuclear war had just happened, there was no communication with northern countries, we didn't know what might happen next, there had been no advance planning or guidance from government and we seemed to be very much 'on our own'. There was no discussion with the whole group about what might happen next within New Zealand. The two groups then went to separate rooms for specific briefings and the role play. Those in the Community group chose their role from one of the following – university student, solo parent at home, pensioner, beneficiary, nurse, local dairy owner, teacher, pharmacy manager, gang member and caregiver. Those in the Cabinet chose their role from one of the following portfolios – Prime Minister, Health, Police, Defence, Civil Defence, Foreign Affairs, Transport, Social Welfare and a few department heads to advise Cabinet. Facilitators instructed the two groups separately. The Community members were told to think about their roles, discuss what their individual immediate concerns were (e.g. the nurse might want to get kids from school) and then discuss how the Community as a whole might respond collectively in the coming days and weeks. Another facilitator worked with the Cabinet group, instructed them to identify the problems in their portfolios and then collectively decide what actions Cabinet would take in the first days and weeks.

After thinking about their responsibilities and discussing options for up to two hours the two groups re-joined to report to each other on what they had decided was the best way forward. Cabinet always reported first and then Community responded. People took their respective tasks within each group very seriously. This showed in the genuinely outraged responses when Community group members heard what Cabinet had decided to do in the national interest. The outrage was the same, even for a role play at the University of Auckland that involved only students in both groups. In brief, hasty Cabinet decisions were draconian and the good citizens of New Zealand would have none of it.

Cabinet response

The Cabinet groups realised that they had a number of immediate crises on their hands and had to respond quickly to what they perceived as critical issues. Not knowing what diesel and petrol stocks were in the country but knowing that these were critical fuels to be conserved for essential services, a rational decision was taken to immediately stop sales pending a rapid stocktake and decisions on rationing according to the needs of critical sectors, such as food industries and food distribution, coastal shipping and heavy transport. The Defence and Police ministers offered to deploy police and army personnel to service stations to implement the ban and stop public use of scarce fuels.

The Health minister was similarly concerned about stocks of essential medicines and how long these would last if they weren't rationed. It seemed prudent and rational to instruct pharmacies and hospitals to withhold use of key medicines pending decisions on rationing for critical needs. The police and army would set up roadblocks to turn back citizens from irrational travel given the likely fuel shortages and to check cars in case people were hoarding food or rationed items. Police or soldiers might be needed for crowd control if looting was a threat at supermarkets.

The PM would go on TV and radio immediately to reassure the country that the government was doing all it could in the crisis, urge people to stay calm, announce the various restrictions, discourage panic buying, ask for the public's cooperation in the national interest and pray that we would pull together as a nation and get through this catastrophic event by working together.

Community response

The Community groups were outraged at these seemingly arbitrary decisions and Cabinet's total lack of consultation with them before implementing such irrational, unfair and repressive restrictions on their individual and collective freedoms. They pointed out that several of them would be needing to travel in the next few days; the 'student' needed to go home to care for sick parents, whānau were off to their marae for more secure housing and food supplies, the 'beneficiary' rationally decided to leave the city to stay with rural relatives. The idea that all

fuel supplies would be unavailable for 'some time' prompted genuine outrage. Similar arguments were made regarding access to medicines. Civil unrest seemed likely if these scenarios were to play out in real life.

The Community group came up with innovative and cooperative ways to use their collective skills to get by in the coming weeks. The gang member said he and his mates would guard the local dairy to stop looters and protect the owner, others volunteered to set up community gardens (school playing fields were quickly offered) and other community support projects were discussed.

These decisions were all very rational and sensible to the Community group members; they were ways of responding to trauma and bonding together at the level they could influence and survive within – the street, neighbourhood, suburb or marae. That the government would act in ways that undermined their rational and constructive responses to a catastrophe was deeply felt as outrageous, unfeeling, and irrational. Their trust in and respect for authority had gone out as inexorably as the next tide but, unlike the tide, seemed unlikely to return.

The lessons learned?

People with different roles and responsibilities can view the world through very different lenses. Those differences are magnified between those with power and those without. When faced with a major, unprecedented catastrophic event, such as nuclear war or, say, a global economic collapse, it takes an extraordinary effort of insight and understanding to appreciate all the demands that would fall on individuals, families, communities and the country as a whole and then act to best resolve or mitigate them. Without forethought, wide involvement and prior discussion of the options across society, the private sector and government, the chances of sensible action and coherent outcomes after a catastrophic event are remote.

In today's much more complex electronic world the likelihood of losing internet and offshore computing services that underlie retail, banking and other businesses would create a cascade of chaos, anger and fear. Urban infrastructures are complex and impersonal; it would be more difficult for urban dwellers than rural residents to adjust to future breakdowns in systems

such as sewage disposal, rubbish collection and food shortages on top of likely job losses. As scarcities grew more severe any large urban flight to rural areas might generate a new set of tensions and social strife.

A presumption that Civil Defence is the organisation to handle a nuclear war response confuses the nature of two very different situations.

It is very important to realise that the situation would be totally different from any that people had ever experienced, including those in authority. A presumption that Civil Defence is the organisation to handle a nuclear war response confuses the nature of two very different situations. Civil Defence is focused on responding to natural disasters. The differences between that and the aftermath of nuclear war are summarised in the following table.

Natural disasters	Nuclear war aftermath
Disaster is localised	Whole country is affected
Help comes from outside	We are alone
Disaster period is relatively short	Problems multiply over years
Focus is 'return to normal'	'Normal' is unattainable
Agencies have prior experience	Who 'knows' what to do?
Social knowledge of disasters	Misinformation is widespread; there is no common experience to rely on
Authorities are trusted	Authorities may be distrusted
World view unchanged	World view shattered
Focus on restoring infrastructure	Entire economic activity affected

Contributors to the study were ambivalent about the appropriate role of government after nuclear war. Some worried about the imposition of censorship, while others doubted that officials who were also coping with their personal concerns would be able to take major decisions in that time of crisis given the lack of prior social engagement and broad agreement on issues such as resource allocation. Our report detailed possible immediate responses by central government as well as longer-term issues of governance. Some thought government would assume 'draconian powers' over an

unruly, unlawful populace; others saw more cooperative responses as conditions forced both government and people to develop more cooperative power-sharing arrangements, possibly at regional scales.⁵² A special working party described three (non-predictive) models of how government might respond and the possible consequences. These were panic and breakdown, a centralised repressive response, and a flexible regional response. They highlight that how government responds could be the central element in post-nuclear war recovery.⁵³ How would decision-making be most pragmatically determined – centrally or regionally? What roles would be relevant for Civil Defence, iwi and marae organisations?

Refugees and Pacific connections

Two important topics for the study team were the possibility of refugees arriving here after nuclear war and how nuclear war might affect New Zealand's complex relationships with Pacific Island countries. In this context 'refugees' became a very broad term as we considered the various possibilities. If there was a long build-up in tensions before an actual northern nuclear war thousands New Zealanders resident overseas might opt to return 'home', probably without jobs or much support on arrival. Thousands of the New Zealanders living in Australia might opt to do the same, again for the perceived security of being as far as possible from conflict zones. The thousands of tourists holidaying in New Zealand at the time would be conflicted – go home, although it might be a nuclear target, or stay put? If they stayed here, relying on credit cards to cover all their costs, their situation would be dire if, as would be likely, electronic banking systems collapsed. Without money, homes, jobs, or friends in New Zealand their futures could be difficult. Strictly speaking, these people would not be refugees under the usual understanding of the term, but their impacts on the country's basic services could be similar to 'real refugees' arriving weeks, months or years later.

As the map projection on the front cover shows, the hemisphere centred on Wellington is dominated by vast expanses of ocean that would deter most people from getting here. Those that did arrive could include military personnel as well as civilians. The study suggested that, notwithstanding the possible arrival of belligerents, the most serious threat for New Zealand could be people arriving with infectious diseases. The arrival of people with diseases such as plague, cholera or typhus, possibly

6–12 months after war ended, could find New Zealand in an extremely vulnerable position with vaccines then in short supply or exhausted, and local manufacturers not yet able to produce vaccines. It would only be speculative to estimate how big the flow of migrants/refugees might be, but the impacts of even moderate numbers on an already traumatised country could be considerable.

As the map projection on the front cover shows, the hemisphere centred on Wellington is dominated by vast expanses of ocean that would deter most people from getting here.

Through bonds of people and trade New Zealand and Australia have long and rich ties with the island countries of the South Pacific. Many island economies are dependent on imports of food, fuel, medicines, tools, machinery and manufactured goods. They also rely on foreign aid while Tonga, the Cook Islands and Samoa receive considerable financial support via remittances from relatives in New Zealand. Like New Zealand, their options for trade would be drastically reduced after nuclear war. Remittances might become difficult to afford or transmit. The ability of New Zealand to supply island countries with critical imports might be severely limited, even if it was willing to do so. Adapting post-war by returning to traditional agricultural and fishing practices would be easier for the volcanic islands with their wider range of ecological conditions and soil types than the atoll countries.

The study team suggested that despite the uncertainties regarding the status and numbers of refugees that might arrive after nuclear war it would be helpful, in advance, to have a better understanding of the key vulnerabilities and practical issues, such as isolating procedures for arrivals to screen them for infectious diseases. We also considered the possibility that not all arrivals would necessarily be friendly. Some could be armed and quite capable of conflict to satisfy particular selfish objectives. There would also be ethical dimensions and well as practical considerations to evaluate.⁵⁴

Conclusions

The study was done at a time of high public awareness and concern about nuclear threats. There was a willingness by many New Zealanders, in both the private and public sectors, to take a serious look at our

particular vulnerabilities and how they might be reduced before and after the unlikely event of a northern nuclear war.

Four major themes emerged from the study⁵⁵ – firstly, our major dependence on trade with northern countries was the overriding issue. The abrupt loss of this trade would rapidly affect all parts of our economy and wellbeing. The lack of adequate contingency stocks (e.g. fuels, raw materials) would make it worse. Second, the tight interdependence between sectors would promote further instability. Loss of fuels or electricity, for example, would affect each other, as well as disrupting transport, health, agriculture and financial systems. Third, vulnerabilities were increasing as the capacity for local substitutions diminished. We called it ‘vulnerability through modernisation’. This vulnerability has grown alarmingly every decade since 1986 across key sectors – communications, health, energy. The fourth theme, the lack of contingency planning by government, stood out as another major weakness. If this is not done in advance of a major catastrophic event it is unlikely to be done effectively in the chaos and limited time available after the event has happened. Contingency planning, by involving citizens at all levels, should lead to a well-informed and supportive public who are more aware of possible impacts, and how communities and government might best adapt to the profound changes. At the time of the study people were ill-informed but open to learning about possible impacts. Unlike many countries New Zealand had no stockpiles of strategic minerals and other reserves. That has not changed as far as I know.

We often talk of ‘resilience’, how communities show resilience as they recover after suffering from floods or earthquakes. Developing effective adaptation approaches to climate change is one aspect of improving our resilience as a nation to a known existing threat. This discussion paper was initially intended to just highlight the main findings of an innovative study into nuclear war consequences for New Zealand done in the mid-’80s. It became obvious that some of the changes since then needed to be included to highlight greater vulnerabilities, i.e. lowered resilience, in an economy where the just-in-time global supply chains can cause major disruptions even during a pandemic.

It therefore makes sense to take out some ‘resilience insurance’ to properly confront the risks and prepare – to do as other countries have done and equip ourselves for an unlikely event that would have devastating consequences for us all.

In his foreword to the study Gary Hawke, Chairperson of the New Zealand Planning Council, wrote that the team had achieved much more than was expected for a preliminary study.⁵⁶ As project leader I was keenly aware of other important topics we lacked the time and resources to look at. These included, for example, impacts on education and social welfare systems. How would the latter cope with projected 40–50% unemployment after trade ceased? But it was always a preliminary study. The next section details our earlier hopes for a more comprehensive second-phase study and my thoughts on what's needed now.

What next? – a proposal

The following discussion points assume the reader has read Box 2 (pp. 22–24) outlining the recommendations from the study team, which were accepted by the Planning Council, for a second-phase study.

Importantly, the objective of the first study was to assess the likely impacts on New Zealand of nuclear war and make recommendations for more detailed second-phase studies to resolve important issues of uncertainty. The study team proposed an independent specialist unit (of about eight people) be established for a limited period (e.g. three years). Three categories of follow-up programmes were proposed:⁵⁷

1. Improve public knowledge and understanding of the likely impacts on New Zealand of nuclear war.
2. Coordinate and establish the rationale for preparing contingency plans to be actioned should nuclear war occur.
3. Identify strategic areas where New Zealand's vulnerabilities to the disruption of nuclear war (or other major shocks) could be reduced.

It is worth repeating that the report stressed the overriding importance of supporting international efforts aimed at preventing nuclear war. Nuclear disarmament initiatives and mitigation strategies in case there is a nuclear war are, however, not mutually exclusive activities. Diplomats can pursue disarmament internationally, while others with appropriate skills are working on mitigation strategies and contingency planning. Nor should mitigation be decried as immoral or defeatist, as if the very act of preparing for an unlikely event with disastrous consequences signals that one has 'given up' and any preparation might make it more likely to happen. Many European countries, including neutral

Sweden, invested considerable efforts into mitigation and planning efforts while simultaneously pursuing nuclear disarmament.

The second-phase study started within government (at the Ministry for the Environment) only to die in the quicksand of bureaucratic inertia. However, the report's publication did prompt the Prime Minister, David Lange, to ask the Law Commission, in April 1988, to 'prepare a study dealing with emergency powers' in the context of national emergencies that included nuclear war.⁵⁸ The Law Commission did so. In 1991 it released a 'Final Report on Emergencies' which included a 'Draft War Emergencies Act' (which did not eventuate).⁵⁹ Like *New Zealand after Nuclear War*, the Law Commission report accurately identified that the main threats to New Zealand from a nuclear war would not be physical effects, but social and economic. The report was very clear:

Section 1.50: A nuclear event, whether arising from a nuclear war or a nuclear accident, could have a similarly drastic impact on New Zealand. The possibility of such an event cannot be discounted despite the ending of the Cold War. While New Zealand is unlikely to suffer the direct effects or, indeed, the indirect physical effects of a nuclear event, its social and economic impact on New Zealand could be devastating.

Section 1.51: A breakdown of international trade would undermine the existing business, employment and financial system. Social and economic disruption could result in increasing disorder and lawlessness. As with war, the consequent threat to the life of the community would call for the grant of wide authority to the executive.

In anticipation of "increasing disorder and lawlessness" the legal response was, understandably, to identify the need for sweeping powers for the executive (ministers and public service), enabling it to pass whatever regulations it considered necessary. Would that approach, taken in isolation of other initiatives, reduce or exacerbate the potential for social distrust of authority the study identified (see Box 1)?

Given that nothing has been done in the public domain since 1986 to specifically address the study's recommendations the question now is 'are the three objectives listed above still relevant?' I suggest they are, but with an important and broader shift in focus.

The Cold War tensions between the US and Soviets have been replaced by different nuclear tensions in different regions but the long nuclear peace is still under threat, possibly even more so at present. Yet New Zealanders are still as dangerously ill-informed about the likely consequences of nuclear war as they

were 35 years ago. The first objective is, therefore, still very relevant. Similarly, the same arguments for being better prepared for the shocks that the study and the Law Commission identified are still entirely relevant. Given our now greater vulnerabilities (see the sections on 'Energy and transport' and 'Communications') they are even more relevant.

But the focus for developing contingency plans and looking ahead to reduce major vulnerabilities should shift. Why? Two events highlight why: the closure of the Marsden Point refinery and disruptions during the COVID pandemic. Government failed to support strategic reasons for ensuring that oil refining continued at Marsden Point, while holding onshore fuel reserves at levels that are much lower than those held by most Western countries. This suggests government discounts the possibility of major shocks to supplies and delivery in general and is content to rely on markets to deliver. Yet New Zealand did experience significant shocks of supply and delivery across a wide range of goods during the COVID pandemic. While less severe, those shocks and disruptions are nonetheless still continuing almost three years on.

It was a reminder that New Zealand can be an afterthought for multinationals at the end of the longest global supply chains. A just-in-time delivery strategy might be efficient and cost-effective but only when all systems are working. Otherwise it is particularly vulnerable to delays and not at all resilient when things go badly wrong.

The focus should shift and broaden from just considering the catastrophic consequences of a low-probability nuclear war.

So the focus should shift and broaden from just considering the catastrophic consequences of a low-probability nuclear war.

It should also include the seriously disruptive consequences of more likely crises such as severe global economic difficulty or breakdown, regional conflicts that seriously disrupt trade, oil price shocks, far more deadly pandemics, and climate-change-induced disruptions. All these risks have in common a focus on building more resilience into our social, economic and political systems to better weather and recover from major shocks. Leading researchers into 'social-ecological systems' have warned that these increasingly complex systems are

becoming so tightly coupled at a global scale that large disruptions are becoming more likely.⁶⁰

Where might these broad objectives be best investigated? They fit neatly into the framework of what will become New Zealand's National Security Strategy, which is expected to be finalised by mid-2023.⁶¹ The Strategy comes under the responsibilities of the Department of the Prime Minister and Cabinet (DPMC).⁶² 'Security' will have a wider definition than the usual areas of defence, law enforcement and intelligence agencies.

Since a Cabinet decision in 2001 national security will be taking an 'all hazards – all risks' approach.⁶³ This means the 'National Security System should address all significant risks to New Zealanders and the nation, so that people can live confidently and have opportunities to advance their way of life'.⁶⁴ Further, 'New Zealand faces growing threats from forces and interests that would do us harm. The range of challenges spans terrorism and violent extremism, strategic competition in the Pacific, foreign interference, cyber incidents, and more'.⁶⁵ Countries at war using nuclear weapons wouldn't be specifically seeking to 'do us harm' but New Zealand would suffer significant 'collateral damage' nonetheless.

Another encouraging feature of the national security system is its emphasis on the importance of resilience, the ability of a system to respond and recover from an event.

As well as the flexibility inherent in the broad approach to risk identification it is encouraging to read that the national security system takes a particular interest in, amongst other things, 'multiple or inter-related problems, which when taken together, constitute a national or systemic risk'.⁶⁶ Would a distant conflict leading to oil supply shocks, coupled with a mothballed oil refinery, coupled with inadequate onshore storage that collectively resulted in severe economic disruption, meet the definition of a national or systemic risk? In my opinion, yes. Another encouraging feature of the national security system is its emphasis on the importance of resilience, the ability of a system to respond and recover from an event. On the DPMC website it states: 'Resilience includes those inherent conditions that allow a system to absorb impacts and cope with an event, as well as post-event adaptive processes that facilitate the ability of the system to reorganise, change, and learn from the experience'.⁶⁷

In this way the security system explicitly links reducing security risks with increasing the resilience of systems, people, institutions, physical infrastructure and communities to respond to and recover from shocks. This was a common theme through the study as summarised in this discussion document, although it used different language. Finally, the second and third objectives listed above, namely the preparation of contingency plans and identifying strategic areas to reduce New Zealand's vulnerabilities to the disruption of nuclear war or other major shocks, match very well with the holistic and integrated approach being used in the national security system, namely:

- 'Reduction — identifying and analysing long-term risks and taking steps to eliminate these risks if practicable, or if not, to reduce their likelihood and the magnitude of their impact;
- Readiness — developing operational systems and capabilities before an emergency happens;
- Response — taking action immediately before, during or directly after a significant event;
- Recovery — using coordinated efforts and processes to bring about immediate, medium-term, and long-term regeneration.⁶⁸

Circumstances and opportunities change over time. Box 3 outlines my thoughts on the challenges to implementation that currently exist. Substantive work on being 'better prepared' for major shocks, even for nuclear war, should now happen in the context of the new National Security Strategy within DPMC, an option that didn't exist back in 1986. Perhaps it might finally come in from the cold.

Box 2: What to do [in 1987]

Source: *New Zealand after Nuclear War* (pp. 149-152), August 1987, New Zealand Planning Council.

The highest priority in the face of the threat of nuclear war must always be given to prevention. Although New Zealand would be among the countries least severely affected by nuclear war, the effects here would still be catastrophic. For our own sake as well as out of concern for the rest of humanity it is important to find and pursue the policies that will be most effective in preventing nuclear war.

But even the best strategies for prevention may fail. Nuclear war is not inevitable but it is possible. What is it worth doing in preparation in case prevention fails?

Faced with relatively unlikely but disastrous possibilities, people do take precautions individually and collectively – such as paying for fire insurance, conducting civil defence exercises and strengthening buildings against major earthquakes. What they are prepared to do depends on a combination of the probability of the disaster occurring and the cost of preparation compared with the cost of not being prepared if disaster did occur. Similar considerations apply in the case of the threat of nuclear war. This study was asked to assess the likely impacts on New Zealand of nuclear war and make recommendations for more detailed second phase studies to resolve important issues of uncertainty. Three categories of follow-up programmes should be considered:

- improving public knowledge of the likely impacts on New Zealand of a nuclear war;
- drawing up contingency plans for action if war occurred; and
- taking action now to reduce vulnerability to the effects of nuclear war.

Improved public knowledge of the consequences of nuclear war for New Zealand is an essential first step. It is needed as the basis on which people decide how much effort to put into preventing nuclear war and to preparing for it.

Because most of the information available now relates to what is likely to happen in Northern Hemisphere countries it is particularly important to

provide better information about the very different effects likely to be felt in New Zealand.

The authors hope that this report will make a useful contribution to better public knowledge. The report does not claim to be definitive: critical discussion of it will identify where fact and interpretation can be improved. There are many areas where more research would be useful; some concerning New Zealand alone are mentioned in the later discussion of contingency planning. Two are more international in character.

Better information is needed about the climatic effects in the Southern Hemisphere of nuclear war. Closer regional co-operation between scientists in Australia, New Zealand and the Pacific Islands could ensure that improved information from Northern Hemisphere research programmes is monitored and that the necessary studies are carried out to adapt and interpret their results for Southern Hemisphere countries.

This study has wide international relevance for studies of the consequences of nuclear war. As a remote food-exporting nation New Zealand is more likely than most countries to survive nuclear war relatively unscathed. However, this study found that physical survival would not guarantee social survival and that without northern trade, collapse of New Zealand economic and social systems is possible. If this is a credible outcome for New Zealand, how might other non-combatant countries fare? Studies carried out in other countries along similar lines would add further understanding of the impacts of nuclear war on the global community.

While research is necessary it must be stressed that making the results available and accessible to the general public is vitally important. It is not just government officials and scientists who are affected by the threat of nuclear war. General understanding of what is likely to happen if nuclear war occurs allows an informed public debate which is necessary both for effective prevention and for effective responses if prevention fails.

Contingency plans for key sectors and systems would play a major role in reducing uncertainty and disruption if nuclear war occurred. The process of preparing them would also improve our knowledge

of the impacts of nuclear war and identify areas where more research would be worthwhile.

Previous chapters identify where contingency plans could be developed now. For example: a plan for central government should set out the major decisions to be made, the methods of communication government would use, and the extent to which it should rely on central direction or the devolution of power to regional or community agencies.

In the health sector, agreement is needed on plans for managing limited stocks of medicines and for maintaining preventive public health systems. The feasibility of producing human medicines in New Zealand should be studied to identify present barriers to production and whether production could begin quickly following the loss of current sources of supply.

For the financial and monetary system, a set of procedures should be agreed for maintaining or replacing electronic systems, guaranteeing deposits, maintaining adequate cash for people's needs and adjusting assets and liabilities in an orderly fashion. This should reduce the danger of sudden collapse in the financial system and retain a capacity to assist rather than impede adjustments in production, employment and consumer demand.

Similar contingency plans should be given priority in communications, energy and transport, and in sectors not examined in this study.

Two important points should be noted. The public exchange of information adds a vitally important dimension: plans drawn up and kept internally by government or by individual sectors would be less useful than plans developed through a public process and exchanged between sectors. Without wide public support, contingency plans would be of little value. Secondly, the preparation of contingency plans for a possible future event like nuclear war can be useful now by identifying weaknesses in current practices. For example, is it only cost that prevents the production of medicines in New Zealand? To what extent does present use of local energy resources take account of uncertainty in future supply?

Vulnerability to the effects of nuclear war cannot be eliminated. It arises not just from dependence on a few strategic imports: it flows from all ties to the rest of the world. But key areas of vulnerability can be identified and the options and costs of improving self-reliance examined. This study has identified some obvious candidates for closer examination. Among medical supplies there may be some which could easily be produced locally and others where the cost of domestic production would be very high. In communications and computer technologies there will be choices between hardening against EMP effects, installing back-up systems, or retaining the capacity to resort to simpler technologies. Stockpiling trace elements for agriculture and promoting a variety of recycling industries are examples of other options for reducing vulnerability to the loss of imports.

The overall purpose of continuing this study of the impacts of nuclear war into a second phase should be to advance from research on the consequences of nuclear war into an active public information programme and into contingency planning where the public is effectively involved in deciding what risks should be accepted and what price should be paid for reducing risks.

Responsibility for these diverse public information, research and contingency planning activities in different sectors should not be given to one agency. Much of the work needs to be done within existing public and private sector agencies. However, to initiate, organise and co-ordinate this second phase programme, a specialist unit should be set up and funded for a limited establishment period. At the end of that time full responsibility for ongoing work should return to the agencies most directly concerned. The specialist unit could prepare material for public information, coordinate continuing scientific investigation, initiate the development of contingency plans and investigate the feasibility of reducing import vulnerabilities.

Above all, it is important that the second phase of this project be paralleled by continuing public discussion about the part New Zealand can play in nuclear war prevention strategies. For while survival may be preferable to death, life without the nuclear threat will *always* be the most important goal.

Box 3: Implementation challenges

First challenge – how to bring about change? Second challenge – where might ongoing responsibilities lie? I've argued that catastrophic events, such as nuclear war, are fundamentally challenges to our national security. Hence strategically addressing and better understanding those challenges fits, I believe, into the framework of the forthcoming National Security Strategy. That strategy will lie within the responsibilities of the Department of the Prime Minister and Cabinet (DPMC). There are two distinct phases for implementing 'what next'. There is a short-term phase for a wider investigation identifying national vulnerabilities and how to reduce impacts, followed by a long-term phase for ongoing implementation. If the approach is wrong it will end up in the 'too hard basket' or 'someone else should do it' or 'not now, later'; all death-knells in different guises.

Phase one is the short-term phase: to create and fund an independent specialist unit as described under 'What next? – a proposal'. 'Independent' is important, but independent of what? Independent of particular departmental or agency 'capture' with the freedom and flexibility to investigate issues or unexpected surprises that emerge during its work. The 1986 study team succeeded in large part because we had that essential independence and flexibility by operating from within the NZ Planning Council. The Council gave us important standing and access to the highest levels of government for interviews and meetings. Backing by DPMC would be needed for the proposed specialist unit. Its membership could include seconded public servants as well as people with sectoral expertise.

To underscore the importance and national significance of the work I suggest the final report of the unit should be tabled in Parliament. This would be a clear signal of its national importance, a need to engage the nation, above any political parties and specific affiliation.

Phase two will require a long-term 'home' for implementation actions, ongoing assessments and improvements, monitoring and public engagement. Given the wide breadth of tasks across all sectors, one logical home for carrying out these functions could be a specific role within DPMC. Other options should be considered, however.

One possible option would be the National Emergency Management Agency (NEMA).⁶⁹ NEMA started operating in December 2019, replacing the Ministry of Civil Defence & Emergency Management (MCDEM). It acts as an autonomous departmental agency, hosted by DPMC. NEMA is the lead for emergency management by government. Under the Civil Defence Emergency Management Act 2002 the definition of ‘emergency’ includes ‘actual or imminent attack or warlike act’.⁷⁰ NEMA has wide powers and broad responsibilities across central and local government for leading and coordinating all hazards and all risks across the emergency management system.⁷¹

However, government intends introducing a new Bill, a proposed Emergency Management Act, to replace the Civil Defence Emergency Management Act 2002, with the aim to ‘address a number of identified shortcomings to ensure the system can meet current and future needs’.⁷²

Work on this new Bill is happening within NEMA as part of its ‘Trifecta’ Programme.⁷³ NEMA intends to have a stronger focus on managing risks, responding to and recovering from emergencies and ‘[e]nabling, empowering, and supporting community resilience’.⁷⁴ These three priorities are also part of its National Disaster Resilience Strategy.⁷⁵

By suggesting NEMA as a possible home for phase two I might seem to be contradicting my assertion on p. 18 that a civil-defence focus on natural disasters is quite different from responding to nuclear war aftermaths. The table on p. 18 spells out the differences. Clearly the focus of NEMA is still very much on civil-defence emergency management following natural disasters, but recent developments indicate a considerable broadening of its scope and much wider engagement across other policy programmes, such as climate change, Three Waters Reform and Te Ara Paerangi Future Pathways, all well beyond what used to constitute ‘civil defence’.⁷⁶

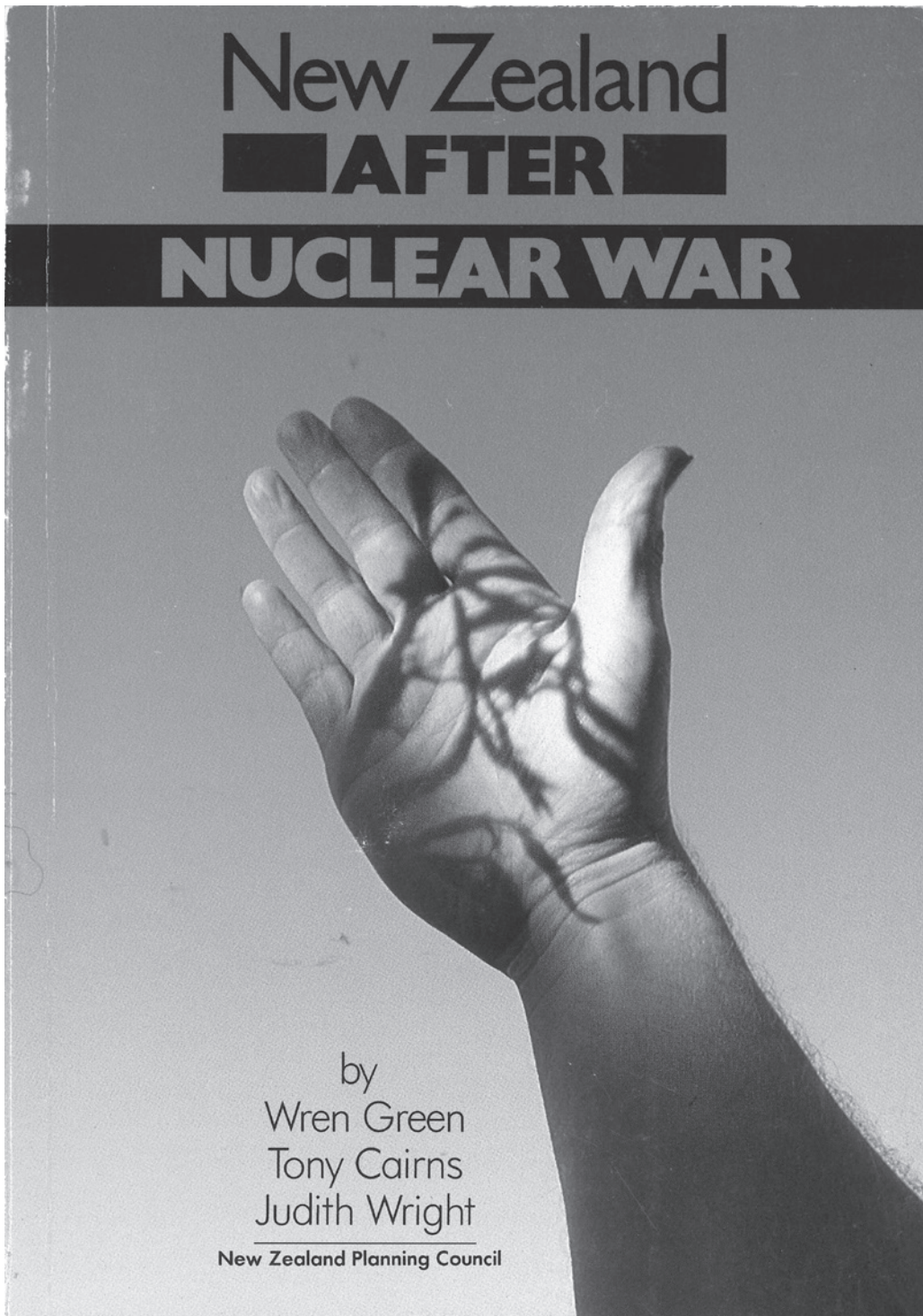
So is NEMA a possible home for ongoing phase two work or are other options better? The outputs from phase one may well suggest the appropriate place to base phase two tasks. A special working party was set up by the study team to consider the likely responses of government to the multiple crises it would face after nuclear war. It recommended the establishment of a ‘Nuclear Impacts Planning Unit’

with a small permanent staff within an existing government department. It suggested that public accountability ‘could be encouraged’ through the unit being responsible to a Cabinet committee or, more desirably, to a select committee of Parliament.⁷⁷

It may also come down to how the new legislation defines ‘emergency’ and whether NEMA has the capabilities and willingness to do things such as developing lists of essential medicines and strategic raw materials or thinking about how to keep food processing industries going and trucks running when diesel supplies are low or exhausted. That implies a future need to work extensively across departments, agencies and the private sector. Not impossible, providing there is a sustained commitment and willingness to do so by all parties, recognising their roles in contributing to the public good and improving the resilience of Aotearoa New Zealand to cope with extraordinary, existential challenges.

Press coverage 1987–1988

At the time, the publication of *New Zealand after Nuclear War* (1987) was extensively discussed in the media. We have showcased a few examples overleaf, but a more extensive record can be found on the McGuinness Institute website, under Policy Projects/Foresight/Revisiting Tomorrow.



NZ without nuclear-war contingency plan

Impact on nation would be 'severe'

The Evening Post, August 24, 1987

No contingency plans have been made in New Zealand to deal with a nuclear war, a Planning Council report released today reveals.

New Zealand After Nuclear War, a six-month study which investigated the effects of nuclear war on New Zealand, found that the impact of a war on the Government, and its ability to operate, would be extremely severe.

Dr Hawke... A starting point

Planning council chairman Professor Gary Hawke said the study was commissioned by the Government as a starting point

for deciding the best form of planning to undertake.

One of the report's recommendations was that a specialist unit be set up to prepare material for public information, co-ordinate continuing scientific investigation and to initiate the development of contingency plans.

The report emphasised that, while research was necessary, it was vitally important to make the results available and accessible to the general public.

"General understanding of what is likely to happen if nuclear war occurs allows an informed

Planning council six-month study

public debate, which is necessary both for effective prevention and for effective responses if prevention fails," the report said.

Principal researcher Dr Wren Green said, if there was a war the effect on society would depend very much on the "level of preparedness of government."

Crucial decisions would have to be made in the immediate crisis period, and the report doubted the Government's ability to cope.

"With Government's current lack of preparedness, it is doubtful the people responsible would be able to cope.

"As individuals, they would be under severe stress, and the systems (such as telecommunications) and structures they depend on might not be able to withstand the pressure," Dr Green said.

Police and the defence department would look to the government for information and instructions.

"Without prior plans, government would have enormous difficulty in knowing what to do, and

every hour of uncertainty would lead to greater panic and chaos," he said.

The report said contingency plans for key sectors and systems would play a major role in reducing uncertainty and disruption if nuclear war occurred.

Preparing plans now would be useful in identifying weaknesses in current practices.

"For example, is it only cost that prevents the production of medicines in New Zealand?"

"To what extent does present use of local energy resources take account of uncertainty in fuel supply?" the report said.—NZPA

Nuke explosion would cripple economy

The Dominion Post, August 25, 1987

A NUCLEAR explosion over Australia would be enough to cripple much of the New Zealand economy in a split second and possibly force people into subsistence living, according to the Planning Council's report, New Zealand After Nuclear War.

By LINDSAY CLARK
Science Reporter

including telephones, radio and computer links, against the possibility of electromagnetic pulse damage.

The shielding and hardening of some vital installations and the encouragement of the manufacture of essential components in New Zealand would be the most practical course of action.

Nuclear bombs exploded high in the atmosphere set off an electromagnetic pulse which is faster and more intense than lightning

and knocks out most electrical equipment in line of sight.

The report says it is unlikely such a high altitude explosion would occur over New Zealand in a nuclear war.

But it is considered more likely to occur over southeast Australia as a disabling act at the start of a nuclear war.

An electromagnetic pulse would be devastating because of its speed and intensity, overcoming ordinary protective devices such as surge diverters.

The pulse would cause a surge in the national power grid of up to three million volts. This would

result in a total blackout. Though some power could be restored within 24 hours it could take at least a year for the electricity system to meet even half the demand.

Most easily damaged would be very sensitive electronic items such as radios, stereos, washing machines, microwave ovens using microprocessors, electronic ignition in cars and computers.

Telephone systems using solid-state switching systems are much more vulnerable than older equipment, the report says.

Valve equipment on old radios

is resistant to pulse effects, while battery powered radios, which were not attached to the mains, would probably be undamaged.

The report says the effect on the communications systems would be disastrous. Many of the computers and communications equipment of the Broadcasting Corporation, Telecom and most government departments including police and defence are not protected.

The amateur radio network would be less likely to be damaged and would be an important avenue of communication.

There would be massive disruption of energy supplies. The Motunui synfuel plant would stop and would not be able to be restarted because its electronic control system would be wrecked. The Marsden Point refinery would close.

Environment secretary Roger Blakey invited the public yesterday to comment on the findings.

The public is invited to make submissions to the Ministry of Environment by November 27 about what study and action is needed.

□ Govt reacts, p15

Nuclear aftermath planning sought

The Press Christchurch, October 27, 1987

By GARRY ARTHUR

Now that the analysts have figured out what would happen to New Zealand if there is a nuclear war in the Northern Hemisphere, they want decisions to be made about preparing for the circumstances they have foretold.

Regional meetings are being co-ordinated by the Ministry for the Environment at which local people and organisations will be able to make suggestions. The Christchurch one, in the Civic Regency on the evening of October 28, will be addressed by Dr Wren Green, the principal researcher and one of the authors of the report, "New Zealand After a Nuclear War."

Dr Green says a lot of the issues identified in the report need to be addressed very quickly. "We're past the talking stage," he says. "What's needed now is some serious planning."

The Government now wants to begin working towards the second phase of activities, and at the regional meetings people will be invited to say what that second phase ought to involve.

"It could go a number of different ways," says Dr Green, "and the government wants to know what people think should be done."

The Ministry for the Environment has put out a pamphlet outlining what it is calling for and what further study and action is needed.

Dr Green says it is trying to involve sectors of the community that would otherwise not be involved. As well as regional authorities, important groups should be thinking about the implications of nuclear war. Manufacturers, for example, need to consider the enormous

implications of losing all trade with the Northern Hemisphere.

Dr Green says Christchurch has to consider what it would do if the central Government could not cope. Mechanisms should be put in place for making decisions that would normally be made by central Government. What legislative changes are needed?

All of this planning should be based on the likelihood that New Zealand would survive a nuclear conflict between the super-powers.

"It would be very different from anything we've known," says Dr Green. "We don't have much experience to draw on that would help us to cope."

"It would be totally different from a natural disaster. Instead of things getting gradually better, they would get steadily worse. And there would be no outside help—we'd be very much alone."

Dr Green says the closest comparison would be the social and economic disruptions suffered by various Maori tribes last century consequent upon the wars and the alienation of Maori land.

He points out that 80 per cent of New Zealand's trade is with the Northern Hemisphere, so it is necessary to ask what is the future of all those sectors of the economy that we now take for granted. In publishing, for example, all of the printing equipment is imported and has imported electronic controls—how would it cope with breakdowns?

Dr Green predicts an immediate rise in unemployment to 40 or 50 per cent—three or four times the unemployment rate of the Great Depression—in a matter of weeks.

He says there are obviously ways of employing more people in the rural sector, but that would not happen in a hurry. Rationing of petrol, medicines and chemicals would have to be planned for.

"Normally, central Government would make those decisions, but it might be impossible for them to do so. Because of the number of decisions they would have to make, and the implementation of them, the Government would not be able to cope. But at the local level it might be more feasible."

Dr Green says New Zealand does not have any contingency plans and the Ministry for the Environment is trying to point out the issues to be faced, what contingency plans are required and what problems we should be addressing.

Public education is necessary regarding the consequences of a nuclear war for New Zealand, Dr Green says, because we have been getting a biased view from the Northern Hemisphere.

He says research is needed into other matters, such as the vulnerability of our cities in the event of social breakdown, or if farmers decide to stay at home. Most major cities have only three days' supply of fresh vegetables.

"We didn't look at that in our report, or at the social implications, or the manufacturing sector's coping ability," he says. "These are some of the subjects for follow-up submissions."

Ways of reducing these vulnerabilities have to be devised—ways of overcoming the lack of planning, and such factors as the substitution of imported medicines with locally produced ones, and the greater use of methanol, natural gas and recycled oil to replace imported fuels. Stand-by mechanical systems that would run longer than the "flashy stuff



Dr Wren Green, one of the report's authors.

we use now should also be planned.

"These are very important issues that need a great deal of careful thought," says Dr Green. "We need to make decisions too about stockpiling key minerals and chemicals."

Although the chance of nuclear war breaking out by accident is considered to be 10,000 to one, the United Nations estimate of the chance of a situation like the Cuban missile crisis building up through mistakes and misunderstandings is 20 to one.

"We've got to recognise that we must think about it as a possibility," says Dr Green, "because the consequences are so huge that we have just got to take it seriously. If the consequences were minor, we wouldn't need to worry."

He compares it to pouring huge amounts of money and effort into strengthening buildings because we know the consequences of an earthquake would be terrible, even though the likelihood is remote.

The Planning Council's report, "New Zealand After a Nuclear War," was based on the assumption that it was unlikely that New Zealand would be a nuclear target.

"It's more useful to assume that we would not be a target," Dr Green explains. "We can't plan for being a target because it would be all over for us, but we can plan for circumstances in which we are not a direct target of nuclear attack. Then we can see clearly what the consequences would be for a non-combatant country."

NEWS FEATURE

If the world went out with a bang, New Zealand would live on with a whimper. LINDSAY CLARK examines the options of post-nuclear life.

The Dominion Sunday Times, August 30, 1987

Nuclear aftermath

PEOPLE in New Zealand would suffer from traumatic feelings after a nuclear war in the Northern Hemisphere.

Many would have strong forebodings of death even though everyone was alive and well and everything appeared normal.

In the first few weeks after a nuclear war New Zealanders would experience severe psychological pressures associated with loss and fear though physically they would be scarcely touched by nuclear radiation.

The destruction of so much of humanity, the deaths of millions of people in combatant countries and the abrupt loss of ties with people overseas would overwhelm many with feelings of loss and dislocation.

This is the picture of life painted in the Planning Council book New Zealand After Nuclear War, published last week.

How people would react to a cataclysmic disaster which despite the lack of immediate personal danger will change their whole way of life is unknown.

In natural disasters such as the recent Bay of Plenty earthquake people respond, contrary to popular belief, with a remarkable degree of self-control and quick adaptation to changed circumstances.

But with technological catastrophes such as chemical spills or nuclear plant accidents such as that of Three Mile Island or Chernobyl people respond in a much more unpredictable way than to natural disasters.

The strongest effect of the Three Mile Island accident in 1979 was demoralisation leading individuals to feel helpless and depressed.

The first concern after a Northern Hemisphere nuclear exchange will be to ensure that family members are safe and together, preferably in their own homes where they can decide together what they will do next.

The second immediate concern will be to seek immediate and detailed information about the nuclear war overseas, about victims and about preventative measures that can be taken.

There is no certainty that New Zealand will not be a target.

Those living in cities or in other potential target areas may want to flee to the countryside.



Rural areas and Maori communities will have access to productive land to grow food and with stronger communal organisations are likely to show more resilience to the crisis.

For many there may be a conflict between meeting work obligations and staying with their families. Absenteeism could plague essential industries such as food distribution and transport.

No one is likely to starve in the post-nuclear New Zealand, though the variety and amount of food available is likely to be restricted quite quickly.

Radioactive fallout is unlikely to be of consequence for crops and stock except milk, which would probably be too contaminated to drink for two months if nuclear weapons were exploded in Australia.

Bread might soon be in reduced supply as less wheat could be grown because of the cooler climate. The reports predict a 3 degree Celsius drop in average temperatures.

With New Zealand's food export markets overseas destroyed overnight there would be huge stocks of meat, cheese, milk powder, butter and apples available for domestic use.

In cities and towns it would make sense for people to use their sections to grow more vegetables since they will eventually become an important part of the daily diet. But ensuring adequate supplies of seed would be difficult in the first year after a nuclear war.

Health problems would emerge but after a few weeks it would be the realisation that people would have to survive without almost all modern medicines that would be the main worry. Most medicine supplies would last only three to six months.

Clean water would be a problem with stocks of chlorine used to purify water lasting only six months.

Sewage could become a serious health problem if pumps or electricity supplies failed. Open toilets which would have to be dug in the backyard could lead to

stomach disorders and the spread of disease.

If there were any high bombs set off over Australia the electromagnetic pulse that would reach New Zealand in a split second could effectively wreck electrical communication and transport systems, though people would be left untouched unless they happened to be holding a long wire where the pulse could be magnified into a severe electrical charge.

It would also render the Marsden Point refinery and the Motunui synfuel plant inoperable and sharply cut supplies of diesel and petrol.

The loss of modern transport systems would see the country revert to sail, horse, bicycle and foot.

Radioactivity not main threat

THE most surprising conclusion of the authors of New Zealand After Nuclear War is that radioactive fallout would not be a major threat to health after such a war.

This flies in the face of a long-held belief that radiation would be the main effect felt after a large-scale atomic war.

The authors of the Planning Council book make their case like this. They assume that nuclear war is largely confined to the Northern Hemisphere and that New Zealand is not a target but Australia receives up to eight bombs.

New Zealand would be protected against radiation damage by three factors—the huge distance from the expected main theatres of war in Europe, the Soviet Union and North America; the rapid decrease in the radioactivity in fallout over time; and the limited amount of radio-

activity which could cross the meteorological barrier of the tropics.

A radiation dose of 600 rems (a measurement of how much radiation energy is absorbed) in a few days would almost certainly kill most humans. A dose of 350 rems to 450 rems would kill 50 per cent of healthy adults over a three-day period. Levels of 100 rems or more would only occur in New Zealand if it was a target.

Only 12 per cent of radioactive fallout can penetrate high enough into the upper atmosphere to be capable of being carried across the tropics. But in fact about 75 per cent of this high level global fallout would drop in the Northern Hemisphere.

The average radiation dose received in the Southern Hemisphere would be almost 20 times lower than the northern hemisphere. Under worst case estimates four to six rems of radiation would be received in total over a 50-year period—a smaller amount than the natural background radiation received from rocks, soil and space (10 rems).

But though New Zealand would not suffer radiation sickness or immediate death there would be an estimated 1 per cent rise in cancers over the following 70 years.

Greenpeace on N-war

The Press Christchurch, October 29, 1987

Two submissions were presented by Greenpeace and the Ngai Tahu Maori Trust at last evening's "New Zealand after a nuclear war" regional meeting at the Civic Regency in Christchurch.

The meetings, co-ordinated throughout New Zealand by the Ministry for the Environment, are calling for public response to the Planning Council's report on the likely effects on New Zealand life after a northern hemisphere nuclear conflict.

A Greenpeace spokeswoman, Kate Bowness, presented a letter, addressed to the Prime Minister, Mr Marshall, criticising the Government's decision to fund the Planning Council report from Rain-bow Warrior reparations money while refusing to fund Greenpeace, which they say, furthers the cause of nuclear war prevention.

Greenpeace also maintains that money should come from the annual billion dollar defence budget to fund it, and the planned second phase of the Planning Council report which will deal with implementing some of the report's suggestions.

The Ngai Tahu Trust's submission had called on the Minister of Foreign Affairs, Mr Marshall, and the Prime Minister, Mr Lange, to present to the World Court a proposal to investigate the "legality or illegality of nuclear weapons."

The submission says, "We are morally obliged to demand a judgment from the World Court... we have not struggled this long for survival simply to acquiesce to nuclear destruction."

The submission suggests that although, according to scientists, physical survival would be possible in the event of small-scale nuclear conflict between minor nuclear powers

such as Israel, it might not be "mentally or spiritually possible" to survive.

It draws a parallel to the occurrence last century of the "Westernisation" of the Maori people and the apparent devastating effects on Maori-dom.

The public meeting was attended by about 90 people, with about half signing the Greenpeace petition. Dr Wren Green, one of the report's authors, spoke for about 90 minutes on the report's findings, with discussion groups held afterwards.

"We didn't look at that in our report, or at the social implications, or the manufacturing sector's coping ability," he says. "These are some of the subjects for follow-up submissions."

Ways of reducing these vulnerabilities have to be devised—ways of overcoming the lack of planning, and such factors as the substitution of imported medicines with locally produced ones, and the greater use of methanol, natural gas and recycled oil to replace imported fuels. Stand-by mechanical systems that would run longer than the "flashy stuff

Disaster effects in parallel

The Evening Post, October 30, 1987

collapse in the world's economy would have exactly the same effect on New Zealand as a nuclear war in the Northern Hemisphere, an environmental scientist said in Dunedin yesterday.

"It would be the same as the catastrophic effect of a nuclear war," he said. "We have been misled by Northern Hemisphere thinking into believing that the main effects will be following

conflict resolution that the recent downturn in the global economy pointed to an urgent need for a contingency plan against the possibility of massive social disruption caused by such a collapse.

"There will be some radiation effects, but the main effects will be psychological and social."

Dr Green, leader of a team of three set up by the New Zealand Planning Council to study the effects on New Zealand of a nuclear war, said the country was vulnerable economically to a world depression as it was to a nuclear war.

"The more sophisticated we are, the more vulnerable we get," he said. "There is no Government contingency plan in the event of a nuclear war in the Northern Hemisphere. The possibility of a complete cessation of trade with the north has enormous implications for New Zealand."

"That would certainly happen in a nuclear war." —NZPA

Nuclear autumn danger

The Guardian, November 25, 1988

Last month was the fifth anniversary of the publication of the results from the first global model which simulated the effects of a nuclear war on the earth's climate. The model suggested that the huge volume of smoke injected into the atmosphere by the blasts, and more importantly by the subsequent surface fires, would reduce surface temperatures by up to 20C over continental areas for prolonged periods.

Lesser cooling effects would spread into the southern hemisphere. This catastrophic by-product of a nuclear war was termed "nuclear winter."

In the past five years considerably more has been discovered about these likely post-nuclear climates. We can identify four main things:

A nuclear war is likely to have a far bigger impact on the earth's climate if it is fought in the northern hemisphere summer rather than in winter since a much greater amount of solar radiation would be intercepted by the smoke.

More sophisticated computer models of the earth's climate now suggest that the resulting temperature decreases would at



most be 10C during the summer and a few degrees during winter. This has translated "nuclear winter" into "nuclear autumn."

Even a nuclear autumn, however, would have chronic effects on agriculture, vegetation and animal life. By altering the length of growing seasons and changing temperatures and rainfall, severe damage would be done to a range of the more sensitive plant and animal species.

And, most recently, the sub-

Nuclear autumn danger

stantial warming (+20C to +50C) which is predicted for the stratosphere at the outer margins of the atmosphere, could well upset the chemistry that protects the ozone layer.

Depletions in ozone of up to 50 per cent could occur, not just over the Poles where current concern is focussed, but over large sections of the whole northern hemisphere.

Although the original severity of the nuclear winter predicted by the 1983 model has been scaled down, the clear likelihood of a major global climatic catastrophe following exchanges in a nuclear war remains with us.

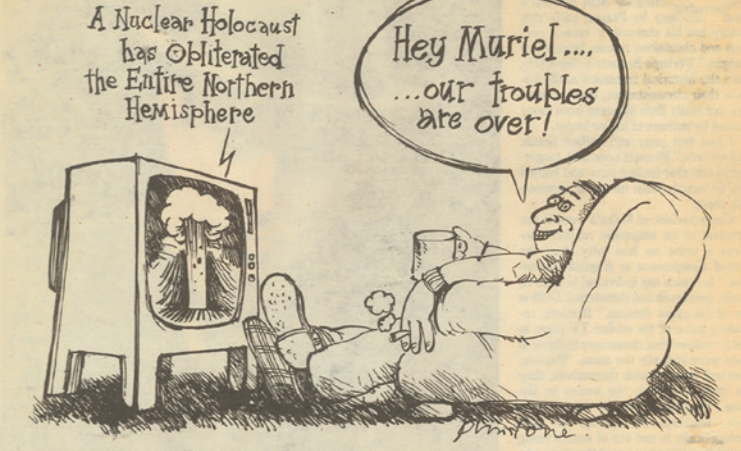
The explosion of a just small proportion of existing warheads would trigger the atmospheric feedbacks. The ensuing chaos and damage to our environment is clearly a factor in the arguments for or against the nuclear deterrent.

It could be disastrous unless we make sure that, as the Prime Minister said recently in a different but relevant context, such "a massive experiment with the system of the planet itself" is never carried out.

Dr Hulme is a Research Climatologist at the University of East Anglia.

Nuclear spring singsong

NZ Listener, September 26, 1988



THE RESPONSE to the Planning Council's report New Zealand After Nuclear War has been very disappointing. People, in responding to the report, have concentrated on its negative aspects, and have failed to perceive the enormous opportunities for New Zealand which would open up if its conclusions proved to be correct.

The report itself is somewhat to blame for this. For example, in dispelling the concept of a "nuclear winter", under which assumption we have all shivered for the last few years, the report still speaks of a "nuclear autumn" (What sort of defeatist nonsense is this? If we can so readily dispatch the concept of a nuclear winter into the paper shredders of the imagination, then I see no reason why we should not move forward, or if you will, backward, from nuclear winter through nuclear autumn and summer, and emerge, faces radiant, into a nuclear spring.)

After all, things are going to keep growing here. The report says so. And we will be able to garner their harvests for ourselves instead of being forced to sell them to the rest of the world. There will be no rest of the world to sell them to, and quite apart from the fact that means there will be plenty for us, the enormous burdens of marketing will be lifted and the desperate search for new markets ended at a stroke.

To be sure, our export receipts will be somewhat affected, but then so will our bill for imports, there being nothing we can import. So the external balance of payments, or terms of trade, or whatever the appropriate index is called, will balance out at exactly zero on each side. That should bring a smile to Roger Douglas's nuclear-wintery frowns. And he will positively break into throaty

equipment. But can this not be seen as a boon also? Of course it can. Politicians from both major parties constantly labour us about the crippling costs imposed on government by our reckless consumption of prescription drugs. Well those costs will be wiped instantly from the slate, and if that will not justify an immediate and swinging cut in both direct and indirect taxation then I don't know what will. Psychosomatic ailments will be left to clear up of their own accord which is, after all, Nature's way. What else have we been given minds and wills and imaginations for if not to clear up the psychosomatic illnesses which are the dark side of those shining gifts?

And sufferers from complaints like arthritis or cancer will be given the chance to acquire moral stature by confronting the reality of their condition, their vision unblurred by medical palliation.

The report raises the spectre of 40 percent unemployment. This may occur. But one person's "army of unemployed" is another person's "large attendance at a community singsong". What is more, the stigma of unemployment will be lifted once and for all if almost half the country suffers from it. Farmers and artisans will once more become the backbone of the country, replacing Auckland yuppies and Wellington civil service high-flyers. And the colourful figure of the swaggar will once more be seen on our roads, with immediate benefit to our national literature.

What the Planning Council report demonstrates, in spite of itself, is that there is nothing wrong with a nuclear holocaust, for New Zealanders at any rate, as long as we make sure that we take a positive attitude to it. None of that "I am Shiva, destroyer of worlds" stuff. All we

Endnotes

- 1 See Gary Hawke in Foreword to Green, W., Cairns, T. & Wright, J. (1987). *New Zealand after Nuclear War*. Wellington: New Zealand Planning Council. Retrieved 1 December 2022 from mcguinnessinstitute.org/about/the-james-duncan-reference-library/new-zealand-planning-council
- 2 See Council of the New Zealand Ecological Society (Inc.). (1984). *The environmental consequences to New Zealand of nuclear warfare in the northern hemisphere*. Retrieved 26 November 2022 from <https://newzealandecology.org/sites/default/files/NZES%201984%20Nuclear%20War%20statement.pdf>
- 3 See BBC. (1 August 2022). Nuclear annihilation just one miscalculation away, UN Chief warns. Retrieved 2 August 2022 from <https://www.bbc.com/news/world-62381425>
- 4 See Ki-moon, Ban. (26 July 2022). Our nuclear fatalism must end. *Foreign Policy*. Retrieved 2 August 2022 from <https://foreignpolicy.com/2022/07/26/nuclear-weapons-ban-ki-moon-fatalism-war-nonproliferation-treaty>
- 5 See Pelopidas, B. (2017). The unbearable lightness of luck: Three sources of overconfidence in the manageability of nuclear crises. *European Journal of International Security*, 2(2), 240–262. Retrieved 25 November 2022 from <https://doi.org/10.1017/eis.2017.6>
- 6 See Mian, Z. & Ramana, M. V. (8 April 2022). India’s inadvertent missile launch underscores the risk of accidental nuclear warfare. *Scientific American*. Retrieved 2 August 2022 from <https://www.scientificamerican.com/article/indias-inadvertent-missile-launch-underscores-the-risk-of-accidental-nuclear-warfare>
- 7 See Kemp, L. et al. (2022). Climate endgame: exploring catastrophic climate change scenarios. *Proceedings of the National Academy of Sciences*, 119(34). Retrieved 4 August 2022 from <https://doi.org/10.1073/pnas.2108146119>
- 8 See Spratt, D. (2 September 2022). Pakistan is a hotspot for climate-driven human security crises. *Climate Code Red*. Retrieved 8 September 2022 from <http://www.climatecodedred.org/2022/09/pakistan-is-hotspot-for-climate-driven.html>
- 9 See Robock, A. et al. (2019). How an India-Pakistan nuclear war could start – and have global consequences. *Bulletin of the Atomic Scientists*, 75(6), 273–279. Retrieved 4 November 2022 from <https://climate.envsci.rutgers.edu/pdf/IndiaPakistanBullAtomSci.pdf>
- 10 See Green, W., Cairns, T. & Wright, J. (1987). *New Zealand after Nuclear War*. Wellington: New Zealand Planning Council, p. 25. Retrieved 1 December 2022 from mcguinnessinstitute.org/about/the-james-duncan-reference-library/new-zealand-planning-council
- 11 See Warner, F. (1988). The environmental effects of nuclear war. *Environment*, 30(5), 2–7. Retrieved 1 December 2022 from mcguinnessinstitute.org/policy-projects/foresight-nz/revisiting-tomorrow/nuclear-war
- 12 See Harwell, M. A. & Freeman, A. C. (1988). Initiating national case studies. *Environment*, 30(5), 25–30. Retrieved 1 December 2022 from mcguinnessinstitute.org/policy-projects/foresight-nz/revisiting-tomorrow/nuclear-war
- 13 See Xia, L. et al. (2022). Global food insecurity and famine from reduced crop, marine fishery and livestock production due to climatic disruption from nuclear war soot injection. *Nature Food*, 3, 586–596. Retrieved 30 September 2022 from <https://doi.org/10.1038/s43016-022-00573-0>
- 14 See Green, W., Cairns, T. & Wright, J. (1987). *New Zealand after Nuclear War*. Wellington: New Zealand Planning Council, p. 9. Retrieved 1 December 2022 from mcguinnessinstitute.org/about/the-james-duncan-reference-library/new-zealand-planning-council
- 15 See Green, W., Cairns, T. & Wright, J. (1987). *New Zealand after Nuclear War*. Wellington: New Zealand Planning Council, pp. 162, 164. Retrieved 1 December 2022 from mcguinnessinstitute.org/about/the-james-duncan-reference-library/new-zealand-planning-council

- 16 See Wikipedia entry for an introduction to the technical aspects. Wikipedia. (24 October 2022). Nuclear electromagnetic pulse. Retrieved 14 November 2022 from en.wikipedia.org/wiki/Nuclear_electromagnetic_pulse
- 17 Statistics New Zealand. (16 August 2022). National population estimates: At 30 June 2022. Retrieved 18 November 2022 from <https://www.stats.govt.nz/information-releases/national-population-estimates-at-30-june-2022/>
- 18 See Green, W., Cairns, T. & Wright, J. (1987). *New Zealand after Nuclear War*. Wellington: New Zealand Planning Council. Retrieved 1 December 2022 from mcguinnessinstitute.org/about/the-james-duncan-reference-library/new-zealand-planning-council
- See Cronin, K. & Green, W. (1989). The New Zealand nuclear impacts study. *Ambio*, 18(7), 407–410. Retrieved 1 December 2022 from mcguinnessinstitute.org/policy-projects/foresight-nz/revisiting-tomorrow/nuclear-war
- See Green, W. (1989). Nuclear war impacts on noncombatant societies: an important research task. *Ambio*, 18(7), 402–406. Retrieved 1 December 2022 from mcguinnessinstitute.org/policy-projects/foresight-nz/revisiting-tomorrow/nuclear-war
- 19 See Green, W., Cairns, T. & Wright, J. (1987). *New Zealand after Nuclear War*. Wellington: New Zealand Planning Council, pp. 33–44. Retrieved 1 December 2022 from mcguinnessinstitute.org/about/the-james-duncan-reference-library/new-zealand-planning-council
- 20 See Green, W., Cairns, T. & Wright, J. (1987). *New Zealand after Nuclear War*. Wellington: New Zealand Planning Council, pp. 38–39. Retrieved 1 December 2022 from mcguinnessinstitute.org/about/the-james-duncan-reference-library/new-zealand-planning-council
- 21 See Green, W., Cairns, T. & Wright, J. (1987). *New Zealand after Nuclear War*. Wellington: New Zealand Planning Council, p. 164. Retrieved 1 December 2022 from mcguinnessinstitute.org/about/the-james-duncan-reference-library/new-zealand-planning-council
- 22 See Green, W., Cairns, T. & Wright, J. (1987). *New Zealand after Nuclear War*. Wellington: New Zealand Planning Council, p. 164. Retrieved 1 December 2022 from mcguinnessinstitute.org/about/the-james-duncan-reference-library/new-zealand-planning-council
- 23 See Green, W., Cairns, T. & Wright, J. (1987). *New Zealand after Nuclear War*. Wellington: New Zealand Planning Council, pp. 118–120. Retrieved 1 December 2022 from mcguinnessinstitute.org/about/the-james-duncan-reference-library/new-zealand-planning-council
- 24 See Green, W., Cairns, T. & Wright, J. (1987). *New Zealand after Nuclear War*. Wellington: New Zealand Planning Council, p. 140. Retrieved 1 December 2022 from mcguinnessinstitute.org/about/the-james-duncanreference-library/new-zealand-planning-council
- 25 See Green, W., Cairns, T. & Wright, J. (1987). *New Zealand after Nuclear War*. Wellington: New Zealand Planning Council, pp. 68–70. Retrieved 1 December 2022 from mcguinnessinstitute.org/about/the-jamesduncan-reference-library/new-zealand-planning-council
- 26 See Green, W., Cairns, T. & Wright, J. (1987). *New Zealand after Nuclear War*. Wellington: New Zealand Planning Council, p. 75. Retrieved 1 December 2022 from mcguinnessinstitute.org/about/the-james-duncanreference-library/new-zealand-planning-council
- 27 See Pharmchoices. (2022). Full list of Pharmaceutical Companies in New Zealand, 2022. Retrieved 18 November 2022 from <https://pharmchoices.com/list-of-pharmaceutical-companies-in-new-zealand>
- 28 See Green, W., Cairns, T. & Wright, J. (1987). *New Zealand after Nuclear War*. Wellington: New Zealand Planning Council, p. 92. Retrieved 1 December 2022 from mcguinnessinstitute.org/about/the-james-duncanreference-library/new-zealand-planning-council
- 29 See Ministry of Business, Innovation & Employment. (18 August 2022). Energy in New Zealand 2022 shows a strong share of renewable energy. Retrieved 18 November 2022 from <https://www.mbie.govt.nz/about/news/energy-in-new-zealand-2022-shows-a-strong-share-of-renewable-energy>

- 30 See Judd, W. (2000). The real oil. *New Zealand Geographic*, 048. Retrieved 22 November 2022 from www.nzgeo.com/stories/the-real-oil
- 31 See Judd, W. (2000). The real oil. *New Zealand Geographic*, 048. Retrieved 22 November 2022 from www.nzgeo.com/stories/the-real-oil
- 32 See Terry, S. (20 July 2022). We need to get serious about fuel supply resilience – and fast. *Newsroom*. Retrieved 26 September 2022 from <https://www.newsroom.co.nz/we-need-to-get-serious-about-fuel-supply-resilience-and-fast>
- 33 See *NZ Herald*. (4 May 2022). More fuel storage needed now. Retrieved 26 September 2022 from <https://www.nzherald.co.nz/sponsored-stories/more-fuel-storage-needed-now/3K5VIGB6JFX7UYUGYPL4BSVMWA/>
- 34 See Woods, M. (9 November 2022). Fuel markets to become more resilient, sustainable and competitive [press release]. Beehive. Retrieved 10 November 2022 from www.beehive.govt.nz/release/fuel-markets-become-more-resilient-sustainable-and-competitive
- 35 See National Road Carriers. (9 November 2022). National Road Carriers supports 21 days diesel holdings [press release]. Scoop. Retrieved 12 November 2022 from www.scoop.co.nz/stories/BU2211/S00147/national-road-carriers-supports-21-days-diesel-holdings.htm
- 36 See Ministry of Business, Innovation & Employment. (26 May 2022). New Zealand’s participation in the International Energy Programme. Retrieved 18 November 2022 from <https://www.mbie.govt.nz/building-and-energy/energy-and-natural-resources/international-engagement-on-energy/new-zealands-participation-in-the-international-energy-programme/>
- 37 See Terry, S. (20 July 2022). We need to get serious about fuel supply resilience – and fast. *Newsroom*. Retrieved 26 September 2022 from <https://www.newsroom.co.nz/we-need-to-get-serious-about-fuel-supply-resilience-and-fast>
- 38 See Green, W., Cairns, T. & Wright, J. (1987). *New Zealand after Nuclear War*. Wellington: New Zealand Planning Council, p. 80. Retrieved 1 December 2022 from mcguinnessinstitute.org/about/the-james-duncan-reference-library/new-zealand-planning-council
- 39 See Green, W., Cairns, T. & Wright, J. (1987). *New Zealand after Nuclear War*. Wellington: New Zealand Planning Council, p. 83. Retrieved 1 December 2022 from mcguinnessinstitute.org/about/the-james-duncan-reference-library/new-zealand-planning-council
- 40 See Green, W., Cairns, T. & Wright, J. (1987). *New Zealand after Nuclear War*. Wellington: New Zealand Planning Council, pp. 88–90. Retrieved 1 December 2022 from mcguinnessinstitute.org/about/the-james-duncan-reference-library/new-zealand-planning-council
- 41 See Green, W., Cairns, T. & Wright, J. (1987). *New Zealand after Nuclear War*. Wellington: New Zealand Planning Council, pp. 61–67. Retrieved 1 December 2022 from mcguinnessinstitute.org/about/the-james-duncan-reference-library/new-zealand-planning-council
- 42 See Dixon, D. (2022). Cloud and sovereignty in Aotearoa. Catalyst Cloud. Retrieved 22 November 2022 from <https://catalystcloud.nz/about/news/cloud-and-sovereignty-in-aotearoa>
- 43 See Dixon, D. (2022). Cloud and sovereignty in Aotearoa. Catalyst Cloud. Retrieved 22 November 2022 from <https://catalystcloud.nz/about/news/cloud-and-sovereignty-in-aotearoa>
- 44 See New Zealand Government. (10 October 2022). Assess countries and service providers for data sovereignty. Retrieved 25 November 2022 from www.digital.govt.nz/standards-and-guidance/technology-and-architecture/cloud-services/help/data-sovereignty/countries-and-service-providers
- 45 See Dixon, D. (2022). Cloud and sovereignty in Aotearoa. Catalyst Cloud. Retrieved 22 November 2022 from <https://catalystcloud.nz/about/news/cloud-and-sovereignty-in-aotearoa>

- 46 See Dixon, D. (2022). Cloud and sovereignty in Aotearoa. Catalyst Cloud. Retrieved 22 November 2022 from <https://catalystcloud.nz/about/news/cloud-and-sovereignty-in-aotearoa>
- 47 Disabling submarine cables is relatively easy. Britain's first act in the First World War was to cut Germany's undersea telegraph cables. The vulnerability of fibre optic cables in times of conflict is well documented. See Sunak, R. (2017). *Undersea cables. Indispensable, insecure*. Policy Exchange, UK. Retrieved 4 October 2022 from <https://policyexchange.org.uk/wp-content/uploads/2017/11/Undersea-Cables.pdf>
- 48 See New Zealand Planning Council. (September 1987). *New Zealand after Nuclear War: The Background Papers* (15), p. 5. Retrieved 27 November 2022 from mcguinnessinstitute.org/policy-projects/foresight-nz/revisiting-tomorrow/nuclear-war
- 49 One aspect of crisis communication can be the reluctance of experts, including scientists, to openly convey uncertainty about what is unknown in the fear that it will reduce public trust. Recent experiments suggest this fear can be unfounded; uncertainty led to only a small decrease in trust in the trustworthiness of the source. Crisis communications, therefore, can be more open and transparent about what is unknown at the time. See van der Bles, A. M. et al. (2020). The effects of communicating uncertainty on public trust in facts and numbers. *Proceedings of the National Academy of Sciences*, 117(14), 7672–7683. Retrieved 24 November 2022 from <https://doi.org/10.1073/pnas.1913678117>
- 50 See Bureau European des Unions de Consommateurs (BEUC). (1986). Chernobyl: the aftermath. BEUC/118/86. Historical Archives of the European Union, BEUC 73. Brussels. Retrieved 8 December 2022 from mcguinnessinstitute.org/policy-projects/foresight-nz/revisiting-tomorrow/nuclear-war
- 51 See Katz, A. M. (1982). *Life after nuclear war: The economic and social impacts of nuclear attacks on the United States*. Cambridge, Mass.: Ballinger Publishing Co. Retrieved 1 December 2022 from mcguinnessinstitute.org/policy-projects/foresight-nz/revisiting-tomorrow/nuclear-war
- The important lessons that were learned about communications during a crisis are well covered in Pell, H. (5 May 2020). Three Mile Island and lessons in crisis communication. *Physics Today*. Retrieved 23 November 2022 from <https://physicstoday.scitation.org/doi/10.1063/pt.6.4.20200505a/full/>
- 52 See New Zealand Planning Council. (September 1987). *New Zealand after Nuclear War: The Background Papers* (15), pp. 4–6. Retrieved 27 November 2022 from mcguinnessinstitute.org/policy-projects/foresight-nz/revisiting-tomorrow/nuclear-war
- 53 See New Zealand Planning Council. (September 1987). *New Zealand after Nuclear War: The Background Papers*, (15), p. 5–6. Retrieved 27 November 2022 from mcguinnessinstitute.org/policy-projects/foresight-nz/revisiting-tomorrow/nuclear-war
- 54 See Green, W., Cairns, T. & Wright, J. (1987). *New Zealand after Nuclear War*. Wellington: New Zealand Planning Council, pp. 126–132. Retrieved 1 December 2022 from mcguinnessinstitute.org/about/the-james-duncan-reference-library/new-zealand-planning-council
- 55 See Green, W., Cairns, T. & Wright, J. (1987). *New Zealand after Nuclear War*. Wellington: New Zealand Planning Council, pp. 148–149. Retrieved 1 December 2022 from mcguinnessinstitute.org/about/the-james-duncan-reference-library/new-zealand-planning-council
- 56 See Gary Hawke in Foreword to Green, W., Cairns, T. & Wright, J. (1987). *New Zealand after Nuclear War*, p. 8. Wellington: New Zealand Planning Council. Retrieved 1 December 2022 from mcguinnessinstitute.org/about/the-james-duncan-reference-library/new-zealand-planning-council
- 57 See Green, W., Cairns, T. & Wright, J. (1987). *New Zealand after Nuclear War*. Wellington: New Zealand Planning Council, pp. 149–150. Retrieved 1 December 2022 from mcguinnessinstitute.org/about/the-james-duncan-reference-library/new-zealand-planning-council
- 58 Lange, D. (22 April 1988). Examination of 'national emergencies' [press statement]. Retrieved 30 November 2022 from mcguinnessinstitute.org/policy-projects/foresight-nz/revisiting-tomorrow/nuclear-war

- 59 See New Zealand Law Commission. (December 1991). *Final report on emergencies* (Report 22). Wellington: NZLC, Appendix D4. Retrieved 18 November 2022 from <http://www.nzlii.org/nz/other/nzlc/report/R22/R22.pdf>
- 60 See Homer-Dixon, T. et al. (2015). Synchronous failure: the emerging causal architecture of global crises. *Ecology and Society*, 20(3), 6. Retrieved 25 November 2022 from <http://dx.doi.org/10.5751/ES-07681-200306>
- 61 See Department of the Prime Minister and Cabinet. (2022). Aotearoa's National Security Strategy. Retrieved 21 November 2022 from dpmc.govt.nz/our-programmes/national-security/aotearoas-national-security-strategy
- 62 See Department of the Prime Minister and Cabinet. (2022). Aotearoa's National Security Strategy. Retrieved 21 November 2022 from dpmc.govt.nz/our-programmes/national-security/aotearoas-national-security-strategy
- 63 See Department of the Prime Minister and Cabinet. (2020). New Zealand's national security system. Retrieved 28 October 2022 from dpmc.govt.nz/our-programmes/national-security-and-intelligence/national-security/new-zealands-national-security
- 64 See Department of the Prime Minister and Cabinet. *Information Sheet 4: New Zealand's National Security System*. Retrieved 14 November 2022 from <https://dpmc.govt.nz/sites/default/files/2021-02/RCOI%20Info%20Sheet%204%20National%20Security%20System.pdf>
- 65 See Department of the Prime Minister and Cabinet. (12 August 2022). Aotearoa's National Security Strategy. Retrieved 14 November 2022 from dpmc.govt.nz/our-programmes/national-security/aotearoas-national-security-strategy
- 66 See Department of the Prime Minister and Cabinet. (2020). New Zealand's national security system. Retrieved 21 November 2022 from dpmc.govt.nz/our-programmes/national-security-and-intelligence/national-security/new-zealands-national-security
- 67 See Department of the Prime Minister and Cabinet. (2020). New Zealand's national security system. Retrieved 28 October 2022 from <https://dpmc.govt.nz/our-programmes/national-security-and-intelligence/national-security/new-zealands-national-security>
- 68 See Department of the Prime Minister and Cabinet. (2020). New Zealand's national security system. Retrieved 21 November 2022 from dpmc.govt.nz/our-programmes/national-security-and-intelligence/national-security/new-zealands-national-security
- 69 In 1959, the Ministry of Civil Defence was established and became a business unit managed by the Department of Internal Affairs. In 1999, the Ministry of Civil Defence was renamed the Ministry for Emergency Management and later retitled the Ministry of Civil Defence & Emergency Management (MCDEM). In 2014, MCDEM moved to the Department of the Prime Minister and Cabinet. In 2019, MCDEM was renamed the National Emergency Management Agency (NEMA); it became an operationally autonomous agency with its own chief executive, responsible for leading and coordinating across the emergency management system (including central and local government) for all hazards and all risks.
- See Kaye, N. (1 April 2014). Civil defence moves to Department of Prime Minister and Cabinet [press release]. Beehive. Retrieved 23 November 2022 from www.beehive.govt.nz/release/civil-defence-moves-department-prime-minister-and-cabinet
- See Henare, P. (29 November 2019). Launch of the National Emergency Management Agency [press release]. Beehive. Retrieved 23 November 2022 from www.beehive.govt.nz/release/launch-national-emergency-management-agency
- 70 See Civil Defence Emergency Management Act 2002 Section 4 Interpretation. New Zealand Legislation. Retrieved 22 November 2022 from www.legislation.govt.nz/act/public/2002/0033/51.0/DLM149796.html
- 71 See National Emergency Management Agency. (n.d.). National Emergency Management Agency. Retrieved 23 November 2022 from www.civildefence.govt.nz/about/about-nema

- 72 See Allan, K. (17 December 2021). New legislation to modernise emergency management system [press release]. Retrieved 23 November 2022 from www.beehive.govt.nz/release/new-legislation-modernise-emergency-management-system
- 73 See National Emergency Management Agency. (n.d.). Building a modern and inclusive emergency management system. Retrieved 23 November 2022 from www.civildefence.govt.nz/assets/Uploads/Trifecta/Trifecta_A3-Explainer18_11_2021.pdf
- 74 See National Emergency Management Agency. (n.d.). Building a modern and inclusive emergency management system. Retrieved 23 November 2022 from www.civildefence.govt.nz/assets/Uploads/Trifecta/Trifecta_A3-Explainer18_11_2021.pdf
- 75 See Ministry of Civil Defence. (2019). *National Disaster Resilience Strategy*. Retrieved 23 November 2022 from www.civildefence.govt.nz/assets/Uploads/publications/National-Disaster-Resilience-Strategy/National-Disaster-Resilience-Strategy-10-April-2019.pdf
- 76 See National Emergency Management Agency. (June 2022). *Briefing to the incoming Minister for Emergency Management*. Briefing number: 22/62, p. 21. Retrieved 23 November 2022 from www.civildefence.govt.nz/assets/Uploads/publications/EM-NEMA-BIM-June-2022.pdf
- 77 See New Zealand Planning Council. (September 1987). *New Zealand after Nuclear War: The Background Papers* (15), p. 6. Retrieved 27 November 2022 from mcguinnessinstitute.org/policy-projects/foresight-nz/revisiting-tomorrow/nuclear-war

Note

The Institute has created a web page for a discussion on nuclear war and its impacts; see mcguinnessinstitute.org/policy-projects/foresight-nz/revisiting-tomorrow/nuclear-war. Here you will find:

- A PDF of *New Zealand after Nuclear War* (1987)
- PDFs of the 19 background papers published to support *New Zealand after Nuclear War* (1987)
- Press coverage of *New Zealand after Nuclear War* (1986–1988)
- PDFs of the 77 endnote references in *Discussion Paper 2022/03*.



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