

New Zealand After Nuclear War

THE BACKGROUND PAPERS

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BACKGROUND PAPER
1 (A) LIKELIHOOD OF NUCLEAR WAR,
1 (B) STUDY ASSUMPTIONS

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IMPACTS ON NEW ZEALAND URBAN SYSTEMS

by David Haigh

*This is one of a set of background papers prepared, in consultation with the Nuclear Impacts Study Team, from material provided by a wide range of contributors for a study of the impacts on New Zealand of a major nuclear war. Along with other sources, the papers comprised the basis of the book **New Zealand After Nuclear War**, by Wren Green, Tony Cairns and Judith Wright, published by the New Zealand Planning Council, 1987. The assumptions that the study was based on are explained in Background Paper 1, note particularly the assumption that New Zealand is not a target, and the variable assumption involving an electromagnetic pulse (EMP - for an explanation, see Background Paper 5).*

BACKGROUND

This paper assesses the implications of a nuclear war (where New Zealand is *not* a target) for the urban systems of New Zealand. Most people in New Zealand live in major urban areas, with 68% in the seventeen largest cities (populations ranging from 30,000 to 500,000). Urban areas are complex systems which depend on a combination of private and public activities to function efficiently. Public infrastructure is well developed in all the cities. Housing, industrial and commercial development is also of a high standard and well maintained.

The major cities are spread out with low-rise buildings and a separation of residential and industrial/commercial zones. Cities depend on transport services and facilities. In New Zealand these tend to be dominated by the private motor car rather than public transport services.

Urban areas are more than the sum total of public and private utilities. They include a diverse collection of people from many cultural and social backgrounds. In the event of a major social and economic breakdown caused by a nuclear war, people would react in a variety of ways, the consequences of which are difficult to predict. However, it is more than likely that the full range of human emotions would be generated (from concern to conflict and from selflessness to selfishness), affecting the social structures needed for the continuance of a changing society.

IMPACTS

Cities have a greater division of labour than rural areas. They depend on public infrastructure and technology, including communications, business systems and transportation. Because of this interdependence they are more vulnerable to social and economic breakdown after a major disaster.

The main public utilities and services upon which urban systems are dependent are: water and food supplies, sewerage systems, refuse collection and disposal, energy supplies, transport systems and employment. This section will deal with each of these and discuss the possible impacts in an urban setting.

Water Supply

Water supply would be vulnerable in both the short and long term after a nuclear war. Water systems depend on a constant supply of electricity and the availability of water-treatment chemicals and spare parts. If New Zealand was *not* affected by an EMP the major impact would occur in the long term when spare parts and water-treatment chemicals may be unavailable. In particular, chlorine production would have to be met entirely from New Zealand sources. If the paper mills ceased production there could be a loss of locally-produced chlorine and general disinfectants. It was estimated by the Ministry of Works and Development that some water-treatment plants would run out of essential chemicals within a month, while all plants would suffer problems within six months. Resumption of trade with Australia would assist in both chemical supply and spare parts.

The greatest impact on the provision of an adequate and regular supply of water would be an EMP. Some urban supplies are partially gravity-fed to service reservoirs (Auckland almost totally and Wellington 50%). Christchurch uses underground water which could be pumped provided the city received adequate supplies of diesel fuel. Dunedin City has the capacity to arrange alternative gravity supplies as a first priority.

Sewerage

The impact on the urban sewerage systems of a war without an EMP would be minimal in the short term, except for the lack of imported spare parts for pumps and treatment plants, and disinfectants for workers. If an EMP did disrupt electricity supplies, the effects of a nuclear war would be felt immediately. All urban sewerage systems are dependent upon electric pumping equipment. Some systems have diesel pumps as a standby but these have insufficient capacity to pump all the sewage. Overflows of sewage would occur, primarily into harbours and smaller waterways. Depending on the length of time that the sewerage system is not working and the size of receiving waters, pollution and potential health hazards would occur. New Zealand's sewerage systems would revert to their past "pollution" period, highlighted in the 1950s' gross pollution of the Manukau harbour.

Refuse

New Zealanders produce over 1.9 kg of refuse per person per day. Of this, 43% is household refuse, 25% commercial, 19% industrial, 13% other refuse. The 1982 Refuse Survey noted that "larger sites (serving populations of over 10,000 people) are in general much better operated than sites serving smaller communities". The collection and disposal of this refuse is a fuel intensive activity - for example the largest Auckland contractor (J.R. McKean who accounts for 60% of Auckland's refuse collection) uses about 2,000 litres of diesel daily. On this basis Council collections of refuse for the 50% of the New Zealand population who live in the eight largest cities is estimated at 8500 litres of fuel per day.

City Council	Vehicles	Workers	Type of fuel used
Auckland	31	103	Diesel
Hamilton	5	16	Diesel
Hastings	2	16	Diesel
Napier	2	8	Petrol
Palmerston North	3	6	CNG
Wellington	20	150	Diesel and Petrol
Christchurch	7	33	Diesel and Petrol
Dunedin	9	34	Diesel and Petrol

Food Production and Delivery

This review concentrated on the production and supply of fresh fruit and vegetables in Auckland (for other urban areas see Background Paper 4). Auckland is situated close to areas of high quality land, e.g. the Pukekohe district (New Zealand's largest vegetable growing area) is 30 km from central Auckland and Kumeu is even closer. The Auckland area produces 75% of its current needs in fresh fruit and vegetables and 50% of its requirements come from within 50 km of Central Auckland. Approximately 80% of growers deliver their produce in their own trucks to the downtown markets, a further 15% use contractors, and 5% use rail.

Auckland grows more than its own needs in some vegetables (e.g. onions) which are sold elsewhere in New Zealand or exported. In 1977 there were 162 growers in the Pukekohe district, cultivating over 5,000 hectares of land, i.e. 27% of New Zealand's fresh vegetable production area (MAF estimate). In the Dargaville to Papakura area there were 180 growers working on 1200 hectares. The two districts accounted for the following percentages of total vegetable growing areas in New Zealand: cabbage (35%) cauliflower and lettuce (30%), onion (72%), potato (20%). (*Horticulture in the Auckland Region*, Auckland Regional Authority, 1980.)

At June 1985 there were 938 farms in Central Auckland (including Rodney, Waitemata City, Waiheke, Great Barrier Island, Manukau City and Franklin) producing horticultural crops, and a further 638 such farms in Northland (data from R. Findlay, MAF).

In addition, there is a sizeable glasshouse industry in Auckland which produces a wide variety of vegetables (particularly tomatoes) and involves over 400 growers. Glasshouses require heating sources, predominantly supplied by electricity and diesel.

Fresh vegetables and fruit are perishable and must reach the retail markets as quickly as possible. Storage facilities at city markets are limited to 3 days storage in Auckland and between 2 and 7 days in Dunedin.

Energy

If New Zealand was not affected by an EMP it is assumed that electricity and gas would still be available to urban areas for some months. Petrol and diesel

rationing would be required regardless. However, a more severe impact, in terms of energy supply, would occur if New Zealand was affected by an EMP. It is anticipated by the Ministry of Energy that electricity would be available for public services, e.g. water and sewerage systems, after 10 days of an EMP. But it is unlikely that the full demand for electricity by private consumers could be met for at least one year. This would mean that many private homes could be without power.

The EMP would affect cities severely. Apart from the effects on homes, the lack of electricity would close down factories and render lifts to tower blocks inoperable, making high-rise buildings unsuitable for present uses. Pumps at garages would not work and hand-pumping of petrol would be required. Street lighting would be out, increasing the potential for crime and vandalism. The recent experience in Auckland (February 1987) where the power supply was interrupted for about three hours gave a clear demonstration of the potential climate for vandalism and looting which exists.

The rationing of petrol would bring about major lifestyle changes in widely spread cities such as Auckland. At present, almost sixty percent of the Auckland workforce of 336,000 travel to work by private vehicle. Even assuming a fall-off in the absolute numbers traveling to work in the same patterns as at present, it is unlikely that public transport would be able to cope with the demand.

An EMP would also destroy the communications system. The telephone and telegraph systems would need to be rebuilt with a mechanical system and operators. Even with no EMP, problems would eventually disable the system due to the lack of spare parts and a simpler system might need to be brought into operation.

Employment

Cities are more than collections of sewers, water pipes and electricity grids. They consist of people, with regular employment providing the main source of social cohesion. With or without an EMP, employment patterns would change. The export economy would cease, creating massive unemployment in the manufacturing and business service sectors. The inability to obtain raw products from overseas for processing in urban areas would have a similar effect.

POST-WAR ADJUSTMENTS

In previous disasters New Zealanders have taken responsibility for their families and community after recovery from their initial shock. Following disasters there has been a high degree of social support. It would be necessary after a nuclear war to build on this aspect of social life to try and create a new low-technology, low-energy and sustainable future. Retired technicians who handled earlier technology may have an important role to play in this. Major adjustments would be social- and employment-related. For example, a great deal of social reorganisation would be necessary due to sudden employment restructuring. Work has an essential and non-replaceable social function. It therefore becomes essential to focus as much attention on this aspect of life as in operating the sewerage system.

Water supply

Dunedin city engineers are optimistic about their ability to deal with problems caused by an EMP by using the local hydro-electricity system and electrical engineers to jerry-rig that system. "Water supply is an ancient craft. In Dunedin, we were supplying water in 1867 - two generations before cars were invented. The supply of water goes back to the roots of civilisation and we would overcome another war if necessary" (Dunedin City Council engineers).

Depending on the length of time without water, a supply for local collection would need to be arranged using milk and other tankers (assuming fuel would be available) and collection at standpipes. Also, temporary roof water collection can be arranged into baths and other containers. An Auckland home with a roof area of 50 square metres could supply approximately 150 litres per day on average. Conservation measures coupled with adequate storage would ensure that a temporary roof system would meet basic needs for a short time.

If surface water became unsafe through high levels of radiation (a problem not anticipated by this study - see Background Paper 9), underground water supplies could be tapped. In Auckland this would mean tapping the aquifers e.g. the Kaawa Shell Bed, Clevedon, South Kaipara and Waitemata aquifers which already have bores and pumps and are capable of providing drinking water. However, the impact of taking this water, which may be needed for food production, would have to be assessed. In the case of the Christchurch water supply, it is estimated that it takes 10 years from river source to extraction of the artesian water. In theory, this gives a decade of non-radioactive water for the population.

Sewerage

Stocks of disinfectants for workers in sewerage works would need to be assured. It would also be essential to ensure that the public was kept away from polluted watercourses. A prohibition on bathing in or collecting shellfish from polluted harbours would require policing.

Refuse

Recycling of refuse in order to re-use valuable resources would become an urgent consideration. Separation of refuse at source (home or factory) would be a necessary activity if recycling was to be efficiently carried out. Composting of organic materials would also need to be encouraged in order to reduce the volume of refuse. If fuel was to be rationed, priority would need to be given to supplies for the vehicles collecting and disposing of refuse. Without an efficient and regular service, the build-up of refuse could lead to health hazards through an increase in rodent and insect population. Street cleansing would also be an essential local authority activity and diesel supply would need to be assured for refuse contractors and local authority vehicles.

Food production

Consideration could be given to increasing the amount of storage for vegetables which keep well such as the potato and kumara. Rodent-proof warehouses in the city which are surplus to business needs could well be in plentiful supply.

Alternatives to commercial food production might also be given a high priority. A great part of Auckland's housing is built on high quality land, previously used for market gardening, e.g. Avondale, Newmarket, Mt Eden, Mt Wellington, Mangere etc. With advice and assistance (and the availability of seeds) together with possible incentives people could grow a large proportion (possibly up to 50%) of Auckland's fresh vegetable needs. This would serve a number of purposes. It would reduce individual and family household costs, release high quality horticultural lands for other uses, e.g. oil seeds and sugar beet for energy farming, and, equally if not more important, it would provide work for thousands of under-employed people. Community gardens could be promoted (as in the 1939-45 War) as could composting systems to replace imported fertilizers. During the period of subsidised employment schemes, a large number of such gardens were started. Large amounts of food were produced from a hectare or two of well-cultivated land. This same concept could be used to develop allotments particularly for people living in city flats.

Energy

The long-term loss of electricity would place a great demand on alternative fuels for cooking and heating purposes. Of major importance would be the availability of coal, coke and wood. Train deliveries to urban centres would be possible, given adequate diesel supplies to the Railways Corporation (or electrification in Wellington). Fuel centres could be established at each railway station for trucking to smaller suburban areas and eventually for home deliveries.

The lack of communications would place a severe burden on people's desire for information. It would also affect the ability of government to inform the people. A system of neighbourhood coordinators would enhance communication.

Employment

Despite the predictions of more than 50% unemployment (see estimates in Background Paper 17) following the collapse of export markets, new jobs could be created in a number of sectors: social service, technology, manufacturing, food production. With reduced reliance on mechanisation on farms and in market gardens, labour would be required in horticultural and agricultural production. With the lack of bitumen, regular maintenance of roads would mean increased labour demand. Jobs would also be needed in factories producing import-substitution products. There would be an increased demand for the skills needed in repairing and maintaining goods, equipment and services (for example the telephone system). There would also be an increased demand for coal, coal products and wood for burning. Perhaps the biggest job growth could be in the caring for others. For example, the health and safety of 100,000 elderly people in Auckland (3% in local body pensioner flats) would require attention.

Neighbourhood co-ordinators might be appointed (if decision-making bodies and funding continues) to ensure that those in need of assistance and advice received support. Their role could be to:

- a) Locate people in their area who need assistance, advice etc.
- b) Provide accurate information to the community.

- c) Help establish a greater level of community self-sufficiency.
- d) Conduct education programmes which aid community and individual self-help.
- e) Identify issues which should be attended to by local, regional, central government.

There would be a need for people to acquire old skills - knitting, weaving, sewing, vegetable gardening. The principle of repairing and recycling rather than discarding would become essential. Assistance and training in currently redundant crafts could be an important social role for the elderly.

Many urban dwellers might wish to return to their 'homes' in other parts of New Zealand. People may consider that they are safer and more self-sufficient in smaller communities. A large number of Maori may want to return to marae and family communities (see Maori viewpoints in Background Paper 12).

The large numbers of Pacific Islanders, particularly in Auckland, would face a similar dilemma. Many might wish to travel to their homeland or place of birth to be with family in what may be perceived as a more self-sufficient environment. In the long term, large sailing boats and yachts might travel regularly between New Zealand and the Pacific Islands to transport people and goods.

PRE-WAR PLANNING OPTIONS

There is a need to collect and maintain the knowledge of low-technology options for services and industry, for example in museums. Continued support for adult education and community development is important in developing individual skills and community self-help. It is important to protect land of high quality for food production purposes.

UNCERTAINTIES AND RESEARCH/PLANNING IDEAS

Areas requiring further research are:

- a) The impact of an EMP on urban areas is uncertain and research is required into the restoration of energy and communication systems after an EMP. The hardening of key electronic systems in New Zealand should be investigated.
- b) Vulnerabilities of urban systems to lack of fuel, spare parts and essential workers should be researched in detail.
- c) More information is needed on the possibility of increasing local manufacture of important chemicals, e.g. chlorine, weedicides, pesticides, disinfectants etc.
- d) An assessment needs to be carried out on the food-growing potential of home gardening in major cities.

- e) Maori and Pacific Islanders' wishes and beliefs should be given priority in planning to minimize potential conflicts between Pakeha and other groups after a nuclear war.

CONCLUSIONS

After a nuclear war there would be major disruptions to utility services (water, sewerage) particularly if there was an EMP. Shortage of fuel would also affect transport services and personal transport. In the longer term, owing to spare part shortages, urban systems would be affected. Rationing of petrol would change travel patterns, employment and social life. A return to simpler technologies, e.g. a mechanical telephone system, would also be likely. Disruption to water supply and sewerage would lead to potential health problems. During periods of emergency, it is important to be more vigilant about health hazards.

A major impact would be on employment. Reorganising labour in order to move away from export-oriented employment towards domestic consumption and service would involve a great deal of effort. The forcible movement of people from major metropolitan areas would not be advisable. People need to stay together as family units in areas which they know.

Cities like Auckland have a potential to become self-sufficient for much of their food supply. Auckland could even become a major provider of food for the rest of the country. Depending on the impact of weather changes and temperature drop, Pukekohe and Kumeu would become even more important as they are situated in warm northern zones. The cities also have the labour necessary for food production under a situation of reduced mechanisation.

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