CLEANING UP MAPUA

THE STORY OF THE FRUITGROWERS' CHEMICAL COMPANY SITE

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CLEANING UP MAPUA

THE STORY OF THE FRUITGROWERS' CHEMICAL COMPANY SITE

Mapua Story: Foreword

For many years the Fruitgrowers' Chemical Company (FCC) at Mapua, was known as New Zealand's most contaminated site. This book is the story of its transformation from toxic site to parkland.

At the heart of the story is the Mapua community. In preparing this book, the Ministry for the Environment is making good on a promise to the community to tell their story and that of the site clean-up, so they are not forgotten.

The clean-up posed significant challenges, including the amount of contamination and the site's location sandwiched between a residential area and a sensitive marine ecosystem. Many lessons have been learnt from this clean-up, both by the Ministry and New Zealand as a whole.

The Mapua story is of a community working together to improve their environment, something we can all do, even when we don't have a badly contaminated site in our backyard.

Paul Reynolds
Secretary for the Environment
October 2011

Introduction

A tourist visiting the peaceful coastal settlement of Mapua west of Nelson today would never know in the midst of this scenic beauty was once New Zealand's worst contaminated site.

More than 150 years ago, Mapua was just a sand dune and lupin landscape, swept by the weather and populated by oyster catchers, fern birds and penguins. The only human visitors were travelling Māori on the hunt for tuna (eel) and shellfish.

Fifty years later, the first Europeans turned the land to enterprise and land prices rapidly increased as the local apple industry grew. The settlement thrived with harvest parties and apple packing competitions in the local hall, and a busy port serving produce-laden boats.

When the Fruitgrowers' Chemical Company (FCC) opened its factory in Mapua in 1932 it brought jobs and prosperity to the area. But over the next 50 years it also steadily poisoned the surrounding land and adjacent estuary with toxic pesticides.

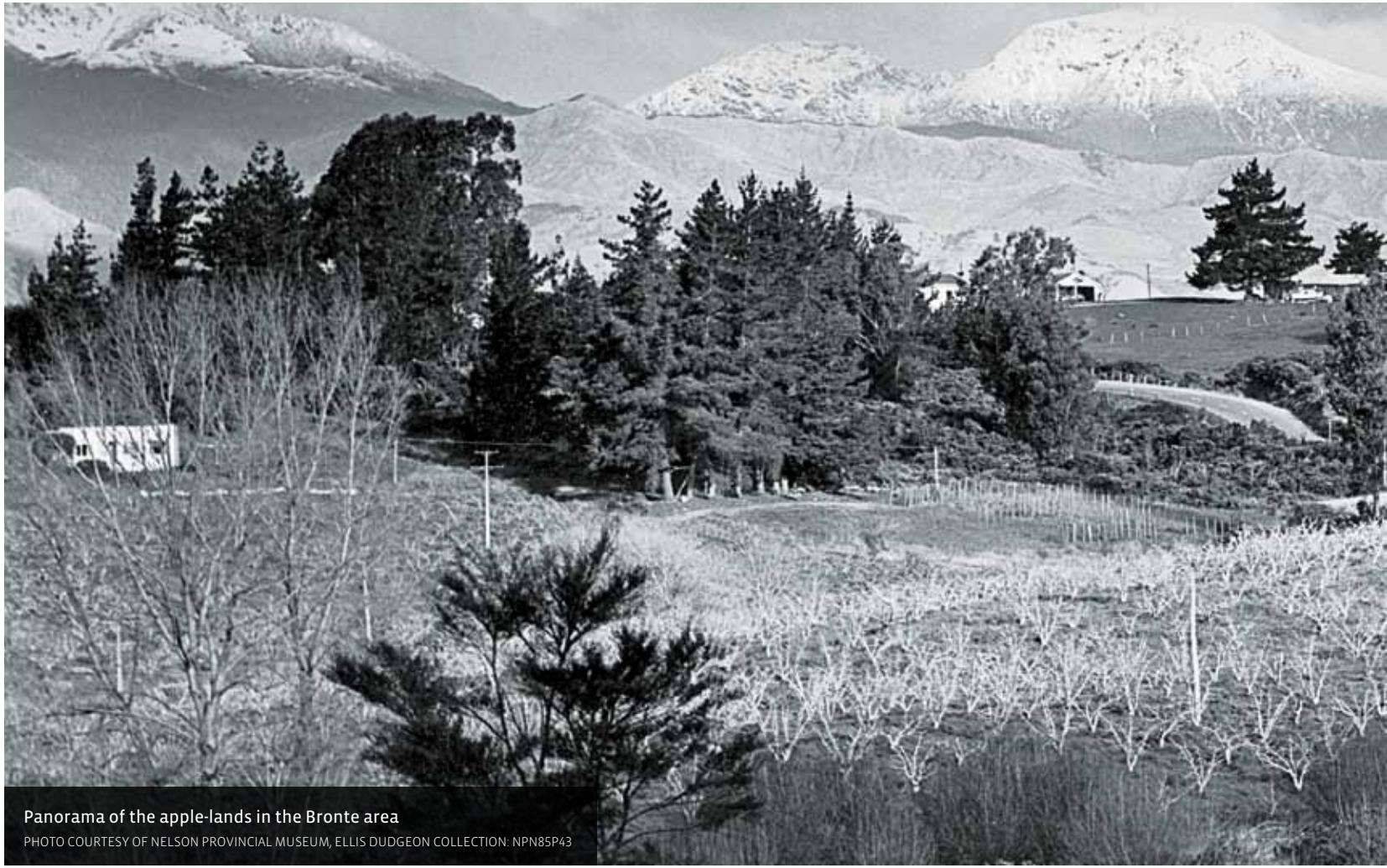
As awareness of the risks of pesticides grew in New Zealand, the local Mapua community began to fight to save its environment. It was a long fight over many years that eventually saw the FCC site closed down in 1988.

The problem of how to clean up the site was taken up by the local council, Tasman District Council. It was a problem of a complexity and scale that was beyond the council's resources and, in 1999, the Government decided to help the council with funding, research and advice.

When the contractor Thiess pulled out of the project in 2004, the Ministry for the Environment took over the remediation of the FCC site. This was the first time a New Zealand government entity had become the owner of a remediation project.

The remediation work posed many unique challenges including that it piloted ground-breaking remedial technology.

After many setbacks and delays, the remediation of the FCC site was finally completed in 2008. A year later the final site auditor's report stated that remediation had been largely successful and recommended ongoing monitoring.



Panorama of the apple-lands in the Bronte area

PHOTO COURTESY OF NELSON PROVINCIAL MUSEUM, ELLIS DUDGEON COLLECTION: NPN85P43

SECTION 1

The Place

CHAPTER 1

Where it began

Mapua's transformation from a simple coastal landscape began when the first Europeans arrived in the mid-1800s.

The first Mapua land to be formally purchased was in 1854, by Captain James Cross, a pilot for Nelson harbour. He bought 166 acres for the princely sum of £60. Captain Cross never lived on his property and it was 11 years later that Mapua's first Pakeha resident arrived – a fisherman named James Heatley Thomas.

Thomas bought the property and built a mud cottage for his wife and three daughters – a lonely landmark in a landscape of scrubby manuka and wiry mānatu (lowland ribbonwood).

He fished and rabbited for his family's survival, taking his catch across Tasman Bay in an 18-foot whaler to sell in Nelson. It was a hard existence, made more difficult when his wife became paralysed in 1877. Although an able sailor, in a sad twist of fate Thomas and his son-in-law drowned in 1889 when a squall caught them unaware.

In 1867, the whole of Ruby Bay (an area of 2000 acres) was bought by a leading Nelson businessman, Edward Buxton, who built a stately two-storey holiday retreat.

FCC chemical site and wharf 1959

He later leased the land to William Stafford, nephew of New Zealand's premier. It was Stafford who began the bay's orchards when, in 1905, he brought in a boatload of apple and apricot seedlings.

The arrival of the Senior brothers in 1906 – Ted and Joe – was another milestone in the area's history. Using timber brought by boat from Marahau, the brothers built a home on the slopes overlooking the Mapua estuary channel. Ted planted a peach orchard which, combined with wattles, splashed the landscape with colour and earned the title of Mapua's 'Garden of Eden'. From 1906–1908, the brothers also ran a flax mill employing several men.

In 1912, the Seniors put their land, then called Seaton Estate, up for sale. The land was subdivided and sold off in chunks. Some was bought by F K Ledger who surveyed the property for subdivision and gave Mapua its modern name. Moutere orchardist, E C Bensemann, also bought 450 acres of the original Seniors' holding.

With the increasing profits from orcharding, land values in and around Mapua grew rapidly. From 7 shillings and sixpence an acre around 1908, land was fetching around £10–35 an acre by 1914.

Much of the area's increasing apple acreage was due to Arthur McKee. He arrived around 1900, taking a break from his Wellington printing business to bike around the region. Impressed with orcharding's prospects, McKee bought an orchard in Riwaka, 100 acres above Ruby Bay and a further 2000 acres in lower Tasman. His passion for apples set the wheels in motion for a new phase in New Zealand's young apple industry.

A coastal road was vital to the industry and the Waimea County Council agreed to carve a road through Ruby Bay to Tasman, with access to the Mapua Wharf.

By 1912, a rough dusty road led through the Mapua flats to the waters of the swift channel. At Ruby Bay, a track wound up the hill and across the bluffs, joining Harley's Road through to Harakeke in the Moutere. The connection to the 'outside world' was fragile, but the scene was set for Mapua's next growth spurt.

Arthur McKee

Loading apples at Mapua Wharf into "Kaitoa"

PHOTO COURTESY OF NELSON PROVINCIAL MUSEUM. COPY COLLECTION C244.

Fruit trucks awaiting inspection at Mapua wharf

MAPUA WHARF – IMPORTANT TRANSPORT HUB

Up until the 1960s, Mapua was an important commercial coastal port serving a vibrant orcharding industry.

It began in the early 1870s when Arthur Chaytor built the first jetty to ship flax fibre and hops poles to markets in Nelson and Motueka.

In 1912, when the fruit industry had begun to increase, improvements were made to the wharf, although the roads leading to it were still rough. Locals were enthusiastic in lobbying the Government to have the roads improved so that the wharf facilities could better service the growing local fruit industry.

By 1915, Mapua's wharf was substantial and dredging was underway to ensure the channel could accommodate the larger vessels being used to ship fruit.

In 1922, a new wharf and a large apple cool store were built.

The following year, 61,000 cases of fruit were shipped through Mapua. By 1931, that had leapt to 355,000 cases, and, by 1948, 550,000 cases went across the wharf. The Fruitgrowers' Chemical Company also used the wharf in its early days, to import raw product for processing.

The wharf was commercially used by the local apple industry until 1964, after which most fruit was trucked to Nelson and loaded into bigger export ships.

The last trading vessels, shipping lime, marble and a little timber, visited Mapua port in 1976 and, by the 1980s, the wharf was falling into decay. Today, however, the area is again vibrant, with restaurants, shops and galleries occupying the old cool store and other warehouse buildings and the wharf restored for recreational use.

CHAPTER 2

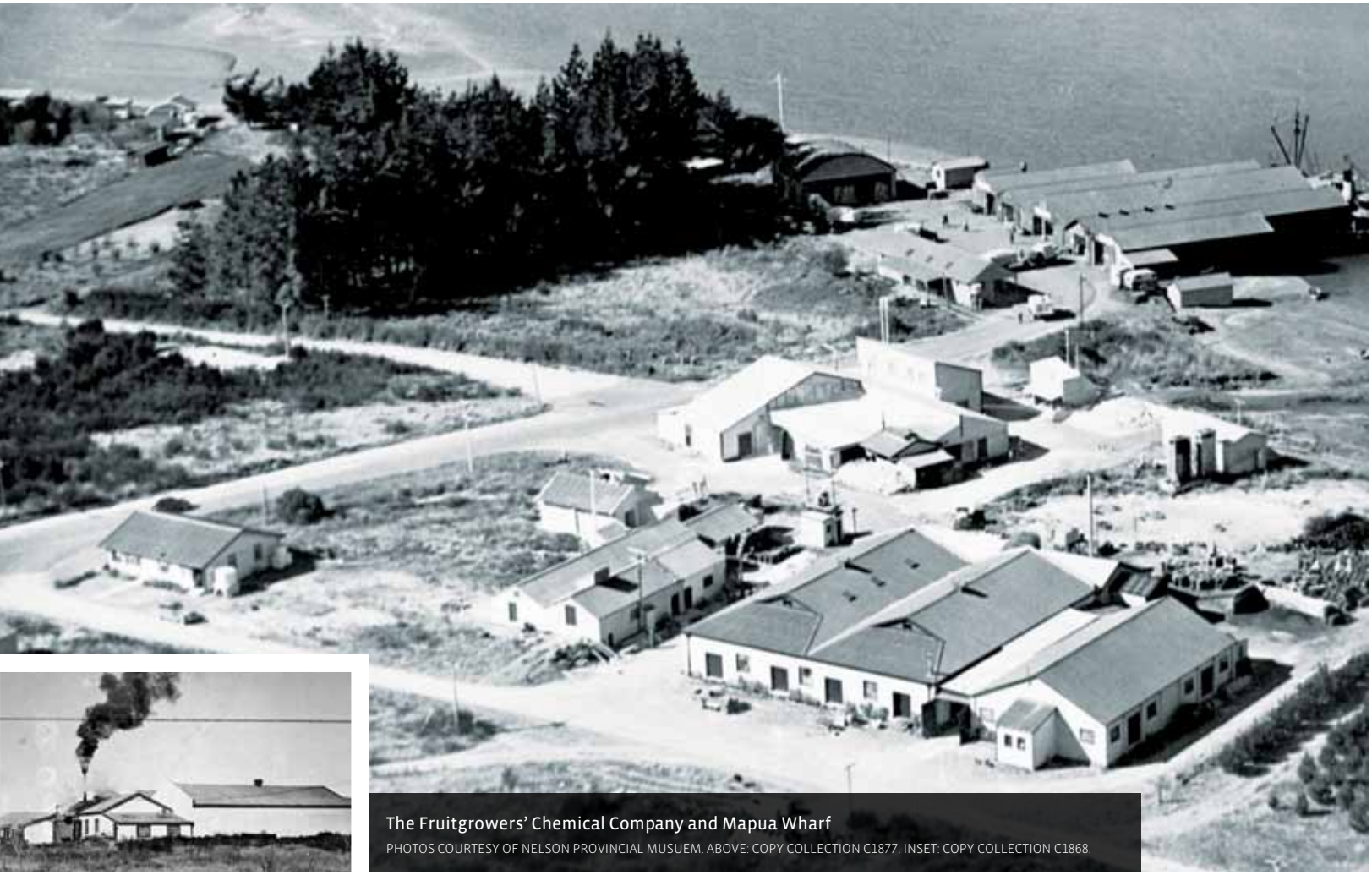
The factory: From pioneer to pariah

The Fruitgrowers' Chemical Company (FCC) began in 1932 in an old coolstore near Mapua wharf.

Owned by astute businessman and apple orchardist, Arthur Mckee, and his two sons, Guy and Tasman (Tas), it became a major contributor to New Zealand's orchard and agricultural productivity.

FCC was regarded as a leading New Zealand company, owning world patents and factories in other parts of New Zealand, as well as one in Australia. It formulated chemical products for leading drug companies including Bayer, Dow Chemicals (USA), DuPont and ICI. The company's production of newer, more effective agricultural chemicals took New Zealand into a new exporting era and reduced the country's dependence on imported products.

It began with the production of insecticides and anti-fungicides, including spraying oils and lime sulphur. Tas McKee, a geology graduate, patented a process to reduce sulphur into finely ground particles, making it easier for plants to absorb. His innovation reduced the country's reliance on English imports and earned an £8000 government loan for a new processing plant and buildings.

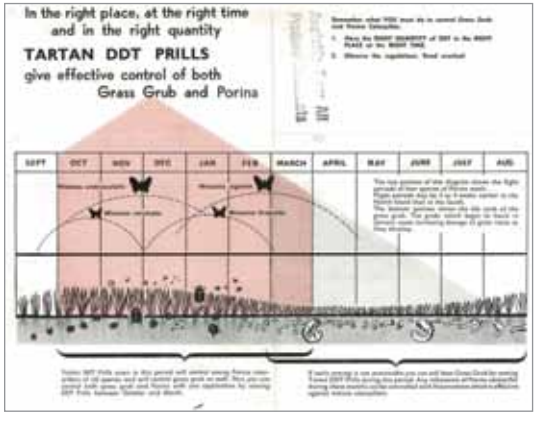


The Fruitgrowers' Chemical Company and Mapua Wharf

PHOTOS COURTESY OF NELSON PROVINCIAL MUSUEM. ABOVE: COPY COLLECTION C1877. INSET: COPY COLLECTION C1868.

Advertisement for DDT Prills

© PHOTO COURTESY OF EILEEN THAWLEY



DDT Prills

PHOTO COURTESY OF EILEEN THAWLEY

In 1938, a subsidiary company, Lime and Marble, started up next to FCC, processing calcite, limestone and dolomite from the McKee-owned quarry on the Takaka Hill. While under the McKee family's ownership, Lime and Marble (L & M) went on to make a name for itself in mining circles, investigating mining potential around the top of the South Island and the West Coast, and surveying the potential for coastal oil extraction and uranium mining opportunities in Buller.

As World War II ended, FCC added synthetic pesticides to its production of chemicals, including DDT, DDD, dieldrin, 2,4-D and paraquat.

In 1945, the first commercial plant to break substances down into small particles (called 'micronising') was installed on the Lime and Marble site. Imported DDT was ground into a fine powder, making its delivery more effective in the fight against orchard diseases and pasture pests, such as grass grub.

The company added a pellet-producing (prill) plant in 1963. By the winter of that year, four companies were operating at Mapua – the Fruitgrowers' Chemical Company, Farm Chemicals Company, Lime and Marble and Buller Uranium Ltd.

As the factories grew, so did their surroundings. On the site's eastern side, a low area filled with rainwater

run-off to make a shallow lake separating the pesticide processing and prill manufacturing sites. Known as Lake Tas, it was eventually filled with factory waste.

To the west, muddy estuarine land was gradually reclaimed until the site spread from the western side of Port Mapua, across to Tahi Street, and over to the inner estuary in the west – a total of 3.4 hectares.

In the early days, apart from a few baches around the estuary's rim, the factories stood alone in the landscape. Being well away from most residential properties, their activities raised little fuss. Indeed, the company proved a lifeline for many families during the depressed times of the late 1930s and 1940s.

The change began in the 1960s with the subdivision of Tahi Street – the factory could no longer operate without affecting the growing number of households.

Also driving the change was the 1962 publication of *Silent Spring* by American author, Rachel Carson, which raised awareness of the dangers of chemicals for nature and for human health.

FCC countered her claims in its 1963 winter newsletter, quoting a Dr W J Darby of the Vancouver University School of Medicine, who said: "Miss Carson's book adds no new factual material not already known to

Silent Spring by Rachel Carson

DDT Microniser Production 1959

FCC pesticides – 2,4-D, DDT and D-Spray 50

such serious scientists as those concerned with [the production of agricultural chemicals], nor does it include information essential for the reader to interpret the knowledge".

But although the formal company line questioned the accuracy of *Silent Spring*, Tas McKee noted Carson's warnings and realised there was no future in persistent agricultural chemicals. His increasing awareness of the need to balance mineral exploitation with conservation was reflected in his last public address, to the 12th Science Congress held at Massey University in 1972, where he argued that it was: "... the mining industry's responsibility to restore mined out areas to a condition acceptable to the community". He also said that previous practices such as: "... indiscriminate clearing and burning of natural forest cover for farms, uncontrolled dumping of waste rock from mining activities, and reckless discharging of waste products into the nearest waterway" could no longer be tolerated.

Even with growing environmental awareness and local opposition, the company's range of products grew during the 1960s–1980s.

In 1978, 124 chemicals were used to produce 84 different formulations.[1] Although more than 80 per cent of the outputs from the site were non-toxic products, such as lime and calcite, the chemical company mixed some poisonous brews, including 245-T and 2,4-D.

[1] From "The Mapua Story" Water & Wastes in New Zealand publication Pg31.

Bill Woperis, scientist in FCC laboratory 1960
PHOTO COURTESY OF EILEEN THAWLEY

Filling drums of DDT
PHOTO COURTESY OF EILEEN THAWLEY

Not until the 1990s was the extent of the chemical poisons left by the plant understood.

After Tas McKee's death in 1973, the family business merged with Transport (Nelson) Holdings and, in 1976, became part of the TNL Group. In 1980, the FCC was sold to BP (New Zealand). Five years later, in February 1985, it was sold to the Gunn Group Ltd.

When the plant eventually closed in February 1988, it was under the ownership of Ceres Pacific, a subsidiary of Corporate Investments, while international company Mintech owned Lime and Marble.

Not until the 1990s was the extent of the chemical poisons left by the plant understood, including offsite dumping at both the Mariri rubbish dump (where a special hazardous waste trench was built to receive loads of FCC waste) and Ngarua, on the company's Takaka Hill property.

A LEADER FOR ITS TIME

The core of the McKees' business was laboratory and scientific research that focused on the manufacture and distribution of agricultural chemicals, and on mineral exploration and processing. The laboratories became increasingly extensive and sophisticated, with a team of chemists and technicians, and a plant pathologist. The McKees' team also frequently consulted with research institutions and universities. By the early 1970s, the firm had developed a significant export trade to Australia in micronised limestone.

> "I took blood tests from staff working with organophosphates once a week."
>
> Shelden Brice, a company chemist

Shelden Brice, a company chemist, said it's important to remember the context that FCC operated in, and that it was a good employer. He remembers the days of peak production in the company's large laboratory.

"I think it is important to put the use of chemicals like DDT, dieldrin and 245-T into the context of the time. DDT was certainly regarded as a relatively safe chemical. It was used for many years as a household fly spray and in the garden on grass grubs.

"From the 1960s, any chemical product we were developing had to have clearance from the New Zealand Pesticides Board – and field trials were required," he said.

Staff welfare was a priority for the FCC Board, according to Brice. "I took blood tests from staff working with organophosphates once a week. When they worked with high concentrations, I took two samples a week and, once a year, all staff had a full medical examination."

He said few former factory workers would argue that they were not well looked after under the McKee ownership. "The Board threw generous Christmas parties and had a superannuation plan for its staff. Even today, the McKee Trust still pays out an annual amount to the factories' former employees and has provided scholarships for the children of former workers."

Coming from a third generation orcharding family, his brother Codger Brice, said it was always accepted by farmers that if you didn't spray your apples, you couldn't export. "The arrival of FCC chemicals was certainly considered a much safer alternative to the old methods. My father started orcharding in 1923 and I can remember him dragging around hundreds of yards of pipe through the orchard to spray chemicals like copper, lead arsenic or nicotine sulphate – all nasties," he said.

FLASHBACK

FROM THE GEOGRAPHIC ARCHIVES

An ill wind

A cloud of the insecticide DDT billows over the beach—and beachgoers—in 1945 as part of a mosquito-control program at New York's Jones Beach State Park. Used in Europe to ward off bug-borne disease during World War II, DDT was once hailed as a miracle product. This photograph was published in the October 1945 GEOGRAPHIC article "Your New World of Tomorrow." But by the time "tomorrow" came, evidence showed that birds from sprayed areas accumulated high levels of DDT, damaging their ability to reproduce. Other research pointed to the chemical as a human carcinogen. Use of DDT was banned in the United States in 1972.

132 *National Geographic, February 1995*

DDT early use in America

EXTRACT FROM NATIONAL GEOGRAPHIC, FEB 1995 ISSUE

THE ROLE OF PESTICIDES

Pesticides have long been an important part of horticulture in New Zealand – by 1903 most fruit growers used sprays of some sort.

The early sprays were first generation pesticides developed in Europe during the 1800s. They included oil soaps and kerosene emulsions, as well as heavy metal compounds – such as copper compounds – and arsenicals such as lead arsenate, used for insect and fungus control.

Arthur McKee was using oil sprays on his orchards in the Nelson–Tasman region by about 1904.

Second generation pesticides were developed as a result of research during World War II, including the persistent organochlorines. DDT is probably the most well known of these. It was introduced as a pest eradicator in 1942, not only to boost food production but also to bolster attempts to wipe out insect-borne diseases, such as typhoid and malaria.

After the war, DDT and other pesticides were made available for civilian use. By 1945, preliminary field trials were underway in New Zealand. As early as 1949, orchard advisers in the Nelson–Tasman region were recommending the use of DDT to control codling moth, a serious pest at the time.

By 1955, DDT was considered a suitable pesticide and promoted by numerous advisory groups. For example, the main insect threat at the time was a pasture-destroying grass grub and DDT was incorporated with fertiliser to combat this pest.

THE ROLE OF PESTICIDES (CONTINUED)

At the time, these pesticides helped to improve the quality of the region's agriculture, which led to higher prices for local produce.

During the 1960s, the use of DDT on farmland became subject to conditions spelt out in regulations and notices gazetted by the Agricultural Chemicals Board. The FCC stopped producing it in 1967.

Between 1968 and 1970, a permit system greatly restricted its use, and DDT was banned on dairy land. At this time the use of DDT (and other organochlorine pesticides) by the timber industry was not restricted.

In 1989, along with all persistent organochlorine pesticides except PCP, DDT was formally deregistered by the Pesticides Board and banned for use as a pesticide for any purpose. PCP was deregistered two years later, in 1991.

The more targeted and more readily degradable organophosphate pesticides are still used today.

Grass grub control notice

PHOTO COURTESY OF EILEEN THAWLEY

Codling mouth damage

PHOTO COURTESY OF EILEEN THAWLEY

WHAT TO DO WITH THE WASTE?

Until the 1960s, most waste from the FCC was taken to local rubbish dumps. But as environmental rules began to tighten, the company found it harder to find a dump site. Things came to a head in the 1980s.

In 1983, FCC had water rights to discharge into the estuary the liquid waste from staff showers, the factory laboratory and the laundry where staff overalls and factory cloth screens were washed. The waste was treated with caustic soda and piped from sumps straight into Mapua Estuary. FCC and Catchment Board staff monitored the discharges to make sure they met the conditions.

However, the Nelson Catchment Board found the conditions were not being adhered to and commissioned the Cawthron Institute to report on methods used to discharge the washwater.

The factory owners were told to correct the problem and the short-term solution was to dump the waste into offal pits on Rabbit Island. From March to June in 1987, 174,000 litres of washwater was dumped there.

The Mapua Residents' and Ratepayers' Association voiced its concern about chemicals leaching into groundwater supplies.

When the news broke, the Department of Conservation, which had been unaware of the dumping, warned it breached the Water and Soil Conservation Act (1967). By September 1987, the practice had been stopped and the Waimea County Council had to pay the cost of the investigation for allowing Rabbit Island to be used as a dumping site.

FCC was left with nowhere to discharge its waste and the estuary again became the dumping ground. While the Catchment Board deliberated how the waste could be diluted to meet the company's water right conditions, the company announced it would close down its operations.

"Nikau" at Mapua Wharf circa 1948

PHOTO COURTESY OF MOTUEKA & DISTRICTS HISTORICAL ASSOCIATION – FERGUS HOLYOAKE COLLECTION, REF WHF1356/1

CHAPTER 3

A vibrant community grew

The arrival of the Fruitgrowers' Chemical Company in 1932 was a lifeline to desperate families, many of them jobless during the Great Depression.

The FCC workforce was a diverse range of people – from locals who gave it their whole working life, to short-term employees looking for a temporary income.

Two temporary staff included famous New Zealand artists Toss Wollaston and Colin McCahon. The story is that McCahon gave paintings away to co-workers during his time there.

Iola McPherson arrived in Mapua as a nine-year-old in the early 1930s – her father was the first to sign on as a McKee employee. As a cooper (a maker or repairer of casks and barrels), he was a company asset, mending pesticide containers and doing other carpentry work around the plant. Later, Iola's husband, Ian, and her brother also joined the company, her brother working alongside his father before he went overseas to fight in World War II.

Iola and Ian McPherson

PHOTO COURTESY OF JEANETTE HANCOCK

She remembers the feeling of desolation on arriving in a village with few people. “There were orchards on the hills, but only a few baches around Mapua; no electricity and no phones. We relied on kerosene lamps for light, and water off the roof for drinking and washing.”

Another long-time resident, Netta Perry, arrived as a young wife in 1939. Her husband began Perry’s Garage, which still operates today. As a new resident on the eve of World War II, there wasn’t much of a village to greet her. Just a shop, a post office and a dirt road to the wharf, used mostly by trucks laden with apples. The butcher came once a week from Motueka and the baker from Tasman brought bread to the door.

The village hall was the hub of the community. The first was on chemical company land and served until needed as part of the plant’s operational buildings. Another building was found – a packing shed at Lucy Hunter-Brown’s orchard in Kina – and moved to the centre of the village during a local working bee.

“Everything happened in the hall. We had apple packing competitions, annual flower shows and there were movies every Tuesday night. Forms were laid out in rows, Stuchbery’s bus would go around the orchards and pick up the workers, and Jim Larkin would arrive with his projector and movie reels,” Netta Perry said.

Apple packing competition at Mapua hall, 1962

PHOTO COURTESY OF NELSON PROVINCIAL MUSEUM, COOPER-SHARP COLLECTION: 237588

Through the 1940s to 1960s, Saturday nights had Mapua Hall rocking with dances run by a variety of organisations. The village was dry so many chose to go to the Moutere pub to get in the mood beforehand. “The dances were so crammed – it was usually standing room only”, Perry recalled.

The hall suppers were famous – giant club sandwiches and soft pink lamingtons overflowing with cream saved many from drunken hangovers the next day. The annual ‘Shipwreck Ball’ was one of the biggest catering challenges, with sacks of mussels, strings of saveloys,

A view of the crowd-filled hall

PHOTO COURTESY OF NELSON PROVINCIAL MUSEUM, BARRY SIMPSON, NELSON PHOTO NEWS COLLECTION: 414 FR21

"Everything happened in the hall. We had apple packing competitions, annual flower shows and there were movies every Tuesday night."

– Netta Perry, Mapua resident

Netta Perry makes a final adjustment to her floral display at the Nelson District Rose Society show in April 1967

PHOTO COURTESY OF NELSON PROVINCIAL MUSEUM, BARRY SIMPSON, NELSON PHOTO NEWS COLLECTION: 971 FR28

endless loaves of buttered bread, big wooden trays full of cakes and a line of kettles for tea and coffee. "The hall was full of noise and dancing, and now and again the crowd would break into a massive conga line of dancers, snaking their way outside, dodging the blackberry bushes in the dark and back into the hall," Netta said.

During apple season, Mapua was the scene of many summer courtships, but the arrival of pubs ended the nights of dancing at the Mapua Hall. It is still the centrepoint – but its role these days is more about meetings and recreation than all-night dances.

Ministry for the Environment former CEO Barry Carbon (sixth from right) visited Mapua and FCC in January 2004 to sign the remediation agreement with Tasman District Council. He is seen here at FCC with council representatives, the local residents and Bryan Black from EDL (in yellow vest).

SECTION 2:

The Players

CHAPTER 4

The community

A local man first sounded the alarm over the production of chemicals at the Fruitgrowers' Chemical Company.

With his wife, Sally, and five children, Chris du Fresne arrived in Mapua village in 1957. They made their first home in Tahi Street, across from the factory.

For a time, du Fresne worked at the Fruitgrowers' Chemical Company where he was employed to build its offices. Once building work at the factory finished, du Fresne picked up projects for orchardists around the district and helped survey the residential sections around Tahi Street. For the latter, instead of money, du Fresne was paid with two blocks of land. He built the family home on the piece bordering the Mapua channel on the east side of Tahi St.

His wife said it was an idyllic life for their five children, with homemade boats to sail on the estuary, sand hills and a beach to explore, and family expeditions around the district.

Chris du Fresne (potter) and inset, Chris and Sally du Fresne on their wedding day

Chris du Fresne turned to pottery, which became his enduring passion at a time when potters were a relatively rare breed. His distinctive red glaze and sculptural pieces were renowned.

It was the unpleasant smells coming from the factory in the early 1960s and stories he heard from some of the factory workers (later given in affidavits at the Tribunal hearing) that first raised his concern about the impact of chemical mixing on the village. As production increased, so did the smell of rotten cabbage, sometimes making his home pottery impossible to work in.

"He had no idea about what chemicals were creating the smell, but he was determined to find out and sought out a chemist to identify the cause. It was gusathian,"[2] Sally du Fresne said.

"Chris wrote to the council to try and get something done about it. Without any remedy offered, the letters flew faster. At one stage a group of government experts arrived to test the cleanliness of the air. A report concluded the air was polluted and we heard that someone at council had scrawled across the top of it 'don't tell Chris'."

[2] Gusathian is an organophosphorus compound used as an insecticide and to kill mites and ticks (acaricide).

THE CANS CAMPAIGN

In 1980, du Fresne's solitary protest was ratcheted up by MP Bill Williams' arrival into the community.

Williams said: "Arriving here, I was struck by the beauty of the land and sea setting. But what seemed at first to be a benign fruit chemical plant turned out to be an obnoxious chemical site on the edge of this beautiful estuary."

"The chemical smell in the air was disgusting and I remember one year it was so unbearable that locals were forced to leave their homes for a day and campers at the Mapua Leisure Park left in droves," he said.

A small group of residents, with Williams as its spokesman, formed a protest group called the Campaign Against Noxious Substances (CANS) to more effectively call the FCC to account. Members were diver John Turner, engineer David Murray, Nelson Mail chief reporter David Mitchell, and Mapua Leisure Park owners Kathy Trott and David Hutton, supported by lawyer, Bill Rainey.

For these few people, with little money, it was a daunting and complex prospect. "We were fighting the factory on its right to manufacture toxic substances in the heart of a community, and we were trying to stop the dumping of that waste in other parts of the district."

CANS wrote to then Minister of Health, Dr Michael Basset, and a senior health official was sent to investigate. Williams said around 70 locals filled up the Waimea County Council chambers to hear the debate.

The result was a Health Department order to FCC to restrict the production of gusathion to weekdays and only during the winter months.

"But what seemed at first to be a benign fruit chemical plant turned out to be an obnoxious chemical site on the edge of a beautiful estuary."

A bag of gusathion
© MINISTRY FOR THE ENVIRONMENT

Mapua resident and CANS campaigner Bill Williams at the entrance to the FCC site
© PHOTO COURTESY OF THE NELSON MAIL

Sally du Fresne said it was Williams' skill and passion that drove the campaign. "He was a brilliant strategist and could put things across so diplomatically, whereas Chris would fly off the handle and wreck any hope of being listened to."

Over the next five years, the CANS group gathered information about the factory's air, noise and water discharges, and the health implications of the chemical particles drifting above ground and seeping underneath the site. The group fought the company's bid to continue its rights to discharge into the estuary and tried to halt its DDT production.

The potential dangers posed by the site were highlighted by a series of events, beginning with a 1982 fire in a factory workshop where orchard sprays were stored. Gas cylinders catapulted into the air and onto the estuary beach and chemical smoke filled the air.

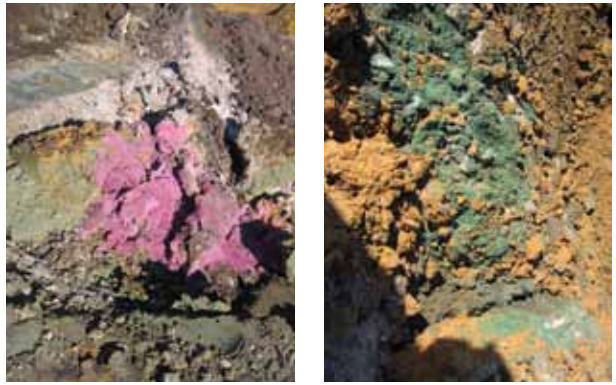
With no reticulated water to fight the fire, the health risks forced the evacuation of some homes in Tahi Street and Iwa Street. The incident also highlighted another risk. The only access road ran through the middle of the factory site, which meant a major fire could trap residents in Tahi Street.

At a meeting in the Mapua Hall, hazardous substances expert, Dr Bob Mann, warned that a full-blown chemical fire could potentially threaten the surrounding population as far away as Nelson city and require evacuation of a huge area.

The factory owners at the time, British Petroleum Chemicals, put together a disaster plan and, in a bid to ease public disquiet, sent a representative to speak to the community about its operation. "We taped the meeting," Williams said. "The troubleshooter from BP took the tapes and promised copies. We never saw them again. That put us on our guard," he said.

The group wanted to make its voice heard – not just in the local community, but across New Zealand and beyond. Letters and articles began to appear in the *Nelson Evening Mail*[3] and, in March 1985, the paper published an article questioning the legality of the company's chemical production in Mapua.

It demanded the council get involved in contingency planning in case of another more serious fire.



Contaminants in soil at FCC site

When the regional television programme *Town and Around* covered the issue, awareness spread across the country. This was followed by a lengthy exposé in *North & South* magazine, and international attention came through *New Scientist* magazine.

CANS was relentless in pushing the issues. It demanded the council get involved in contingency planning in case of another more serious fire, and this was in place by March 1986. As well, other company activities were continually pulled into the public arena – from noise and smell complaints, to alerts on the dangers of the chemicals produced, the impact of discharges and dumping, and the potential effects on public health.

[3] The Nelson Evening Mail was renamed The Nelson Mail in 1999.

AN IMPORTANT BATTLE WON

In the early 1980s, the Waimea County Council moved to change the land-use zoning for Lime and Marble and the FCC sites from 'Industrial' to 'Heavy industrial'. At around the same time, the FCC wanted permission to start up a new plant to manufacture copper chromium arsenic (CCA) – used in the treatment of wood.

CANS, the Mapua Residents' and Ratepayers' Association and environmental groups rallied every ally and what evidence they could to present at the 1987 Planning Tribunal hearing.

Council, politicians and government officials were lobbied; meetings were held to discuss tactics and challenges; fundraisers were organised; and every opportunity taken to push the issue into the media.

The media publicity brought in support, mostly from outside the district. "This was what we needed," Williams said. "We didn't have the money to fight giants, so we had to be cunning. We had to embarrass the site owners, regionally, nationally and internationally," Williams said.

Submissions to the 1987 Planning Tribunal hearing were compiled, witnesses were asked to appear on behalf of the community and lawyer, Jon Jackson, pulled the threads into a strong case.

The hearing was a critical turning point. It ran for five days, with mountains of evidence and hours of testimony.

In his submission, Williams warned about the risks of producing copper chromium arsenic in the heart of a rapidly growing community. "Copper chromium arsenic is commonly called the criminal poison. The effects of even very small quantities are ghastly. It is hard to imagine a more deadly, dangerous chemical," he said.

Aerial photo of Mapua with line around the abandoned FCC site

Another community witness and chemistry expert, Andrew Earlam, described the disastrous effects the chemical would cause in the event of a fire at the plant.

Judge Treadwell said that the Court was: "... in the unenviable position of having to decide between two land uses that had grown side by side but were now mutually incompatible, despite attempts by the company management to cooperate with the local population."

The Court found that the risks of accidental discharges into the water table, chemical spills or fire that had the potential to cause the evacuation of a residential settlement were not acceptable. It ruled that, although the company's activities had been within the law, the proposed new activity did not meet the permitted activities of the new Industrial G zone it would operate on.

The Court summary said that the situation was succinctly summed up by a witness who said: "Waimea is one of the biggest counties in New Zealand and it was beyond his comprehension that planning should encourage the establishment or continuance of a noxious industry in the middle of one of its most valued recreational and residential resources."

The outcome, a year after Chris du Fresne's death, was a huge victory.

For the company, business at Mapua was all but over. The Court decision, growing awareness of environmental impacts, the arrival of stricter rules, and the increasing ease of importing cheap chemicals from overseas finally ended production.

Within a year, in 1988, the doors were locked and the factory closed.

Mapua resident Bill Williams (centre) makes a point at the 1987 Planning Tribunal hearing

PHOTO COURTESY OF NELSON PROVINCIAL MUSEUM.
THE NELSON MAIL COLLECTION: 4438A

MORE WORK TO BE DONE

The closure of the FCC in 1988 may have left the work site quiet, but there was more to do.

The new owner of part of the eastern site, Mintech, did not accept that the site was contaminated and proposed selling the lime processing site as a going concern. However, Lime and Marble had shared the FCC micronising plant on its site, which was used to produce DDT prills back in the 1960s.

Williams, then chairman of the Mapua Residents' and Ratepayers' Association, said there was clear evidence to back up claims that the Lime and Marble site was contaminated and needed to be cleaned. This included an affidavit by long-time employee, Ian McPherson, who believed more than half a cubic metre of DDT had been dumped in the drain over a period of years.

Another resident and site worker, Frank Robb, was reported saying that: "This dumping would occur on a daily basis when the plant was producing DDT, which was more than half the time it was in operation". Robb said that equated to the contents of a 10-litre bucket each day.

The evidence was presented at a Tasman District Council (TDC) meeting. Mintech's response was to send a warning letter. Williams said: "The local MP and I made statements about the irresponsibility of the move in light of the site's use. The publicity resulted in a letter from Mintech's New Zealand manager threatening to sue us for defamation. When you are up against that sort of money, we did the only thing we could do in the circumstances – we shut up."

Soil sampling with an auger at Mapua during remediation

Similar concerns emanated about the state of the rest of the site, still owned by FCC. In May 1989, excessive levels of dieldrin, pp-DDE (a residue of DDT) and lindane were found in domestic water wells near the factory site. (Reticulated water was not installed at Mapua until 1991.)

As well, pine trees on land bordering the factory died, while other trees in the row, away from the site, were still a healthy green. Chemical residues were blamed.

Mintech's application to sell was turned down. The company shut down its operations and moved out of Mapua.

SECURING THE SITE'S FUTURE

After years of negotiation, consultation, tests and trials, the Mapua community readied itself for restoration of the FCC site. The Mapua Residents' and Ratepayers' Association, chaired by Wilma Tansley, took up the baton. Tansley remembers the first time she and a group of determined locals met to talk about life after the clean-up.

"It was the year 2000. I joined Annette Walker, Pat Perry and others at a meeting near the site. We decided it was about time we pushed for the clean-up to get cracking and to look at what kind of future locals wanted for the area."

They canvassed people's ideas. Committee member John Jackson drew up plans of the most popular options, and local computer whizz, Marcus Graf, turned the hand-drawn plans into impressive images.

"Within three weeks, we presented the ideas to the council. They were stunned at the professionalism of the proposals but sent us away empty–handed, saying it was too early to consider what should be done after the land was fixed up."

The group continued to keep up the pressure, driving the community's case at meetings of the full TDC and the Motueka Community Board.

"We knew there wasn't much time. The developers were already sniffing around. We could see slices of iconic coastline all around the country being lost to the public. We knew if we didn't keep the pressure on, our little corner would also be lost."

In their drive to save the waterfront, Tansley and her group wooed everyone with influence over steaming coffee and cakes at Port Mapua's Smokehouse Cafe.

Port Mapua's Smokehouse Café

"We became total coffee addicts and our partners were abandoned for the good of the cause. Sometimes we had four meetings with people in a day. Viv Fox, the (then) Smokehouse owner, was fantastic. We would ring her up, often at the last minute, and she would have a table ready for us and our guests and often didn't charge us for the coffee.

"We lobbied councillors, TDC staff, cultural and creative people. We even 'coffeed' Marian Hobbs, who was the Environment Minister at the time, and she was lovely. She said the future site had to be for the public good."

On 18 July 2001, 13 months after their first presentation, the Mapua group again went to the TDC's full council meeting to hear the verdict on their campaign for public space and a waterfront park. The decision was a nail biter – seven voting for the proposal and six against.

> "We knew there wasn't much time. The developers were already sniffing around... We knew if we didn't keep the pressure on, our little corner would also be lost."
>
> – Wilma Tansley, Mapua Residents' and Ratepayers' Association

Remediation work at FCC site

"We were so relieved that the council listened to the will of the people and I want to acknowledge the support that councillors Paul Sangster and Trevor Norris gave us," Tansley said.

The following year, as the site became a rowdy paddock of trucks and bulldozers filled with people in white hazard suits, Mapua locals began to reflect on the past and the future. The then chairman of the Mapua and Districts Community Association, Jim Bryse, said, in a way, having the site locked up was an advantage, as it kept options open for its future use.

CHAPTER 5

The council

NEW COUNCIL INHERITS A HUGE ECO CHALLENGE

The 1989 reform of New Zealand's local government combined the small rural councils of Motueka, Richmond, Golden Bay and Waimea Counties into a new territorial authority – the Tasman District Council (TDC).

Two years later, when the Nelson-Marlborough Regional Council was split up, its environmental management roles also came to the TDC. This included the former Nelson Harbour Board's jurisdiction over reclaimed land which covered just over a hectare of the 3.4 hectare FCC site.

The council faced a complex and difficult challenge – an abandoned chemical factory site of unknown toxicity and companies who contested their liability for cleaning it up. It had to research decontamination options, work with an anxious community waiting for action and face ratepayers fearing they would end up paying for the clean-up.

But before any of those hurdles could be cleared, the council had to negotiate with the companies.

Andrew Fenemor, TDC's project manager for the FCC clean-up

John Hurley, ex TDC mayor (left), and Barry Carbon, ex Ministry CEO, sign the remediation agreement

"It was a hot potato and we objected to inheriting this massive problem. We knew even then that sorting out the mess would be a long and painful headache," said the TDC's then Chief Executive, Bob Dickinson.

Initially, the TDC put pressure on the FCC site's owners, Ceres Pacific, to control leakage and stormwater discharges. Four years after it had ceased operations, the company contracted consultants Woodward-Clyde to investigate the contamination. The findings showed the site was full of poisons. Groundwater on the western side had high concentrations of lindane, DDT and dieldrin. On both sides, high concentrations of DDT and dieldrin were found in shellfish.

Meanwhile, Mintech, now owned by Omya, was not admitting liability for past pollution on the Lime and Marble site, and tried to sell its operation as a going concern.

The council was prevented from doing a site investigation for the whole 3.4 hectares, but it could at least begin work on the two areas it had inherited from the Harbour Board – the old landfill at the western end of the FCC site, and a reclaimed strip along the estuary to the east.

The council's project manager, Andrew Fenemor, launched a decontamination campaign. When rushes were cleared from the estuary's western boundary, mud streaked with pink and red was revealed – evidence

that chemicals had been dumped and leaching into the sea. Stopping the leachate was the first priority and, in 1992, TDC constructed a three-metre deep clay bund (retaining wall) along the water's edge, and capped the old landfill with clay. For the next two years, while responsibility for arresting the contamination was contested, work continued around the skirts of the site to map contamination in soil, groundwater and estuary sediments.

Faced with valueless land and threatened with legal action by the council, both Ceres Pacific and Mintech wanted out. By 1996, both companies had paid the TDC a modest six-figure sum to take over their land titles on the condition they would not be made liable.

As part of its deal with the council, Ceres Pacific also covered the cost of removing 30 tonnes of solvent waste and organo-phosphate chemicals which were in rapidly disintegrating drums stacked in the company's dangerous goods shed. In 1996, TDC began the delicate task of identifying and removing the drums and shipping them to Wellington. Later the same year, the council had the buildings dismantled and the land was laid bare.

Taking ownership of the 3.4-hectare site was a courageous move for the council – although it had verbal promises of government help, the solution and its cost were still uncertain.

Tasman District Council sign at FCC site

Drums of contaminated matter ready for transporting off-site to Wellington

Tasman District Council's Jenny Easton doing field work

THE POTTER'S DAUGHTER HELPS FINISH WHAT HER FATHER BEGAN

In 1995, environmental scientist, Jenny Easton, began work in the Tasman District Council's environment and planning department. As the daughter of Chris du Fresne, Easton's student days were punctuated by her father's campaign against the Mapua factory – letter writing, phone calls and tirades. She didn't know then that she would be part of the solution.

When Easton joined the council, it had already launched a proposal to cap and contain the Mapua site and work was underway to identify other chemical hotspots in the district – from old landfills to farm dumps. One was the council-owned Mariri dump, which was capped to prevent any leaching of pollutants. Some privately-owned land, such as the ex-herbicide factory along the road from Mapua, and waste dumps, were also capped.

As the TDC's site liaison person for Mapua, Easton eventually became familiar with every metre of the contaminated area as she assisted initial contractor Thiess with 200 test pits. "One of my first jobs on the old factory site was to supervise the removal of the drummed up waste in the dangerous goods shed, before all the buildings could be removed."

Informing the public on why there was a need to carry out the Mapua clean-up was a priority. "Many people would say: 'Well I know so-and-so who worked there for thirty years without gloves or a mask and has never been sick, and if it's so bad where are all the dead birds and animals'. It is true that people who worked there during the earlier days worked with DDT with their bare hands and would then eat their lunch or have a smoke; but this chemical was less harmful to humans than the later sprays that were produced, when the workers wore full protective clothing."

"The thing to remember about the effects of persistent compounds is that, in general, they don't have an immediate impact on human or animal health. One reason there weren't any local dead birds could be because they are mostly migratory and didn't stay long in the worst contaminated areas."

Easton said that TDC knew the task of cleaning up an ex-factory site would be very complicated. "With no proper records or plans we came across numerous old sumps and pipes, strange chemicals used in one-off experiments at the factory, as well as organochlorine waste buried onsite as 'reclamation' and in shallow dumps. As Ministry for the Environment scientist, Howard Ellis, said, 'the place was an absolute time bomb'."

THE INVESTIGATION

By 1997, Fenemor and Easton had developed a good picture of the contamination which spread across the old factory's soils, the estuary sediments on both sides, groundwater, and stormwater discharges. Fortunately, tidal waters were normally clear of the organochlorines.

Soil samples were classed according to their toxicity. The most contaminated soil was in areas known as 'hot spots', where there was raw product or high concentrations of chemicals. There were also 800 cubic metres of marine sediments in front of the site that were up to 50 times above internationally accepted standards for marine life.

Investigations began into possible clean-up options. These included chemical stabilisation with concrete, vitrification to melt the soil into glass, thermal desorption (heating the soil in a nitrogen atmosphere), a composting technique known as bioremediation, and capping the site with clay.

Bioremediation looked promising, and Fenemor, working with Howard Ellis, Ministry for the Environment senior adviser, studied bioremediation and desorption techniques being trialled in the US. These methods had not, however, been used at a large scale with organochlorines, and the favoured method used in the US was excavation and removal to a dedicated hazardous waste site. However, Mapua had no specialised landfill available.

With funding still uncertain, the most reliable option seemed to be capping the site with clay and diverting groundwater from the buried waste using an underground slurry wall up to 12m deep. The estimated cost was $2.75 million. However, although the resource consents were granted in 1997 they were appealed by Forest & Bird Society and this method did not proceed.

That year, the Government expressed a wish that the site be remediated, rather than just contained, and the Ministry for the Environment convened a 'Technology Review Committee' to look at the options. The cost to remediate the site was estimated at between $5–11 million. Twenty-six companies from around the world lodged expressions of interest offering a range of remediation options, and three were shortlisted.

"There were a lot of things we could have done differently and faster, but it was a complex situation and we were dealing with a whole lot of unknowns," Dickinson said. "The Mapua problem had hung around for 10 years until technology caught up. At the same time the Government changed the funding ratio, covering 70 per cent of the cost, which made the project viable."

Site worker with protective clothing and a respirator

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Rusty leachate oozes from landfill

PHOTO COURTESY OF TASMAN DISTRICT COUNCIL

Pink-dyed DDT prills

© MINISTRY FOR THE ENVIRONMENT

> "The Mapua problem had hung around for 10 years until technology caught up."
>
> – Bob Dickinson, then TDC CEO

In 1999, the Government established the Orphan Sites Remediation Fund[4] to provide money for contaminated sites where responsibility could not be attached to the offenders. Mapua was top of the list and $3.1 million of national funding was allocated.

During 1999 and 2000, the three shortlisted companies were involved in treatment trials. These included a composting type of bioremediation, thermo desorption and a process known as Mechano-Chemical Dehalogenation (MCD), an innovative technology developed by an Auckland-based company called Environmental Decontamination Ltd (EDL). The MCD process involved screening and drying the soil, adding simple reagents and pulverizing the soil mixture inside a rotating reactor with tonnes of steel ball bearings, to break down the pesticides. The laboratory trials gave the TDC and Ministry confidence to go with the New Zealand-based MCD process.

Australian civil engineering contractor, Thiess Services, was awarded the decontamination contract and was to obtain the resource consents. Thiess estimated 6150 cubic metres of contaminated soil needed treating.

From 2001–2003, Thiess dissected the site into a grid of 200 test pits and took 1200 samples to document the soil's make-up and its degree of contamination. With help from Fenemor, Easton and Tonkin & Taylor consultants, it progressed the complex set of resource consent applications through a hearing and appeals to the Environment Court by New Zealand Forest & Bird and Greenpeace.

Meanwhile, the kiwi-grown MCD process was fine-tuned to meet proof-of-performance requirements and demonstrate it would bring the soil to the required environmental standards. Adjustments were made to reduce the MCD plant's noise and vibration, which were badly affecting some local residents.

After years of exhaustive soil groundwater and marine sediment sampling, peer reviews, technology research and treatment trialling, and Environment Court hearings and appeals, the clean-up finally got the green light in November 2003. Thiess and EDL successfully completed the proof of performance required in the consent conditions but before the champagne corks could fly, a last minute crisis left the project hanging in the balance – Thiess pulled out.

[4] In 2003, this fund morphed into the Contaminated Sites Remediation Fund.

Pamphlet to households 1999

© PHOTO COURTESY OF TASMAN DISTRICT COUNCIL

COMMUNITY SUPPORT FOR COUNCIL'S WORK WAS VITAL

Dickinson said the council realised that a successful result depended on the community's endorsement of the clean-up, and its awareness about the 'why', 'how' and 'when'. Consultation over the treatment options began in 1997, and every household received a leaflet explaining the findings and the proposed decontamination options. The council set up the Mapua Taskforce to oversee the process and review progress. The Taskforce included representatives from residents and ratepayers, site neighbours, Tasman District councillors, and Fenemor and Easton.

Chair of the Mapua Residents' and Ratepayers' Association Wilma Tansley (in red jacket) celebrates the decision to go ahead with the site clean-up with Association members and Mayor John Hurley (far left) at the Smokehouse café in Mapua

© PHOTO COURTESY OF WILMA TANSLEY

Explaining the complex aspects of the project to the public, including the types of remediation being considered, was a complex task, Easton said. "Seeing us wearing protective gear on-site when sampling the soil had some (people) speculating that the safeguards were overkill, and others thinking everyone in Mapua would be poisoned."

Dickinson said: "A lot of credit should go to Wilma Tansley and her team in the Residents' and Ratepayers' Association. They managed to balance community feeling with the practical realities. She kept the partnership on a constructive course and held back radical views. Without this will to see it through together, the project could have turned into a fight without benefit to anyone."

CHAPTER 6

The Ministry

When Thiess pulled out of the Mapua clean-up in 2004, the Ministry for the Environment (the Ministry) decided to take on the remediation project itself.

The Ministry became the consent holder and re-engaged the contractors. This pushed it into a new operational role, a first for the policy-oriented agency.

However, the Ministry had already been involved. In 1997, it had convened the Technology Review Committee to look at options to remediate the site. Senior Ministry adviser, scientist Howard Ellis, was the key liaison person with the TDC and said a partnership was formed with the council to resolve the issues posed by the Mapua site. Sampling, testing and analysis of the soil and potential treatment processes continued.

Meanwhile, without a decision on how the site should be cleaned up, the Government's funds for the project were rolled over year-after-year. The lack of action was testing the patience of the Mapua community and the TDC.

Then Ministry CEO Barry Carbon (centre right) discusses the site clean-up with representatives from the council and Mapua Residents' and Ratepayers' Association

Previous Minister for the Environment Marion Hobbs talks to site manager John Roosen at the FCC remediation site

In 2002, the arrival of the Ministry's new chief executive, Barry Carbon, coincided with the then Environment Minister Marian Hobbs' request for a full review of every aspect of the Mapua project.

"By 2002, around $1.2 million had been spent on testing, but not a single grain of soil on that site was cleaned," Carbon said. "It was time to put an end to the reviews, the strategies and investigations. If central government wanted credibility we had to start fixing some of the things that were broken. A visit to the Mapua Residents' and Ratepayers' Association showed they were of the same view."

The Ministry and the council were fortunate to have community support for the huge and complex task ahead. But the long delays, including appeals, were causing problems for the contractors, as shown by the Thiess pull-out in 2004. This radically changed the Ministry's role.

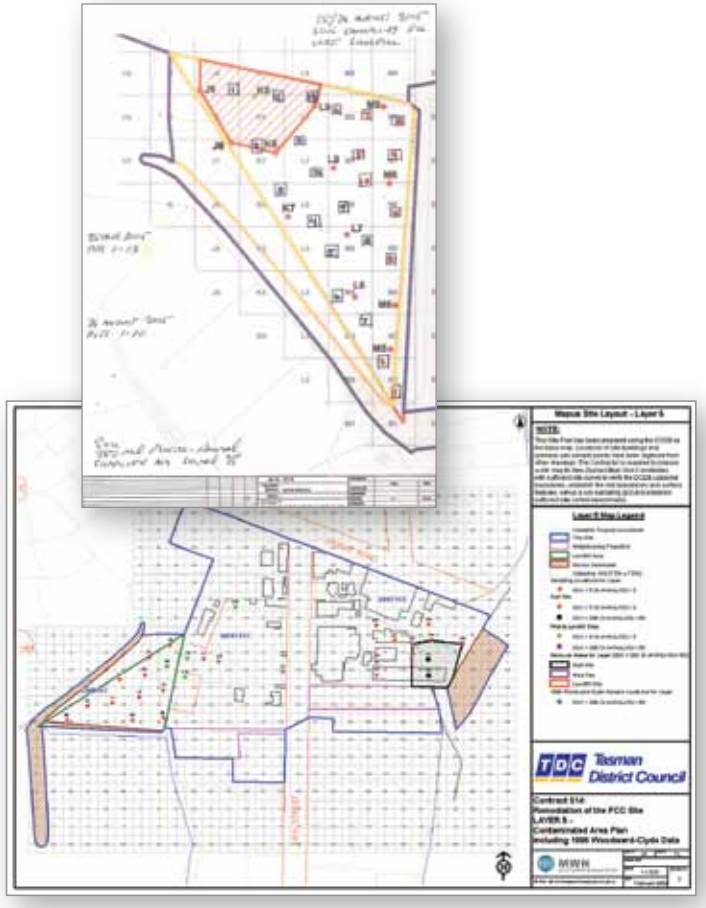
Carbon said: "For the first time in New Zealand, a government ministry effectively became the project owners. We negotiated with Thiess to take over its resource consents and planning knowledge. We managed the work, contracted the companies, hired site managers and specialist staff to cover every aspect of the clean-up. This move was unheard of. The Ministry had turned from science advisers and policy makers to project managers on an epic scale."

The Ministry knew the cost impacts of the project would also be felt by the ratepayers of the Tasman District. To reduce those impacts as much as possible, it was agreed that the Government's contribution would be made first, allowing the council's $2 million loan to be drawn down in the latter stages. This would make the TDC's costs more short term, enabling it to sell off areas of the clean site for residential and commercial development, offsetting the loan costs and reducing impacts on the community.

This marked a landmark change to the Government's policy on the management of contaminated sites and how it used the Contaminated Sites Remediation Fund.

Carbon said he was extremely proud of his staff being prepared to accept this challenge.

He also praised the Mapua community and TDC. "As partners in this project, the Mapua people were amazing. They grasped the complexity of the work, were involved in the planning and had been patient with the disruption to their community. They have a legacy to be proud of and a legacy that goes beyond Mapua," he said.



Pit map and site map

Stockholm Convention on Persistant Organic Pollutants (Ministry publication)

MAPUA'S INFLUENCE ON THE STOCKHOLM CONVENTION

In 1999, the Ministry began New Zealand's negotiations on the international Stockholm Convention on Persistent Organic Pollutants (POPS).

This treaty obligates governments to take measures to eliminate the production and use of persistent organic pollutants. It set out countries' obligations to protect human health and the environment by banning the production and use of some of the most toxic chemicals.

The Convention became international law in May 2004, and was ratified later that year by New Zealand.

Senior Ministry adviser, Howard Ellis, was instrumental in framing New Zealand's contribution to the treaty and said the knowledge gained from the Mapua tests was significant in helping shape the Convention. All the work on the Stockholm Convention highlighted the issues posed by the contamination at Mapua.

Howard Ellis, senior Ministry adviser

Site manager John Roosen (left) helps another remediation worker remove a soil sample for laboratory testing.

SECTION 3

The Clean-up

CHAPTER 7

World-leading technology

The technology used to remediate the site at Mapua is an example of kiwi ingenuity developed by Auckland-based Environmental Decontamination Limited (EDL).

EDL was subcontracted by Thiess to carry out the soil-cleaning process, and the Ministry renewed this contract when it took over the project in 2004.

From its inception in 1998, EDL had set out to solve the challenge of delivering safe and efficient decontamination of the soils at the FCC site, developing and patenting its revolutionary technology.

EDL was supported in its research and development by a partnership with Auckland University of Technology and through $450,000 of central government funding from the then Foundation for Research, Science and Technology.

The outcome was the world's first full-scale Mechano-Chemical Dehalogenation (MCD) plant at Mapua.

With the type of soil at Mapua and its contaminant load, the plant's production averaged 83 cubic metres a week, with an organochlorine destruction efficiency of about 90 per cent.

The uniqueness and success of the technology lay in the patented MCD reactor. Dried soil was milled in it using high-velocity steel balls – these collided with each other, the contaminant molecules and added reagents, such as urea and quartz sand. The mechanical energy released by these collisions resulted in a wide range of diverse chemical and mechanical reactions which quickly reduced the contaminants to non-toxic carbon residue and inorganic products.

Because it did not use incineration, toxic emissions or harmful by-products were minimal and the decontaminated soil was able to be returned to its extraction site as soil suitable for commercial land uses.

Remediation work began in the Series II MCD plant in November 2004, and a Series III plant, capable of greater energy efficiency, was added in early 2007.

While not without its challenges and delays, in September of 2007, the job was deemed complete and the Ministry issued a 'Certificate of Practical Completion' to EDL, and returned its contract bond.

The EDL plant

CHAPTER 8

The site manager

When the resource consents transferred to the Ministry in 2004, it formally re-engaged EDL to do the remediation work, and took on decontamination expert, John Roosen, as site manager.

Roosen, the owner and director of Nelson-based company Effective Management Systems, was now in charge of liaison between the community, the council and the Ministry; compliance with resource consents for the clean-up; oversight of earthworks, plant and contractors; and public relations.

Roosen began work on the FCC site in October 2004. "I remember walking around the site to the eastern contamination zone and onto the foreshore by the Waimea Estuary. There was not a living thing in that mud. No insects, no seaweed clinging to rocks, no crabs, no birds. It was all dead," he said.

Site manager John Roosen taking soil samples

Remediation site works

The site was in various stages of exploration, with hills of covered soil and trenches that exposed layers of pink, white and oozing black.

Roosen had managed around 500 clean-ups in the USA, Asia and the Pacific, ranging from the remediation of large DDT dumps, to cleaning up the aftermath of a massive rocket fuel explosion. The project was not large in comparison to those others, but posed a unique challenge by sitting in the heart of a residential and commercial community. When he joined the project, Roosen said the site was in disarray, with no tracking of the excavations to date. Setting up a system to track all excavated material was a top priority.

Another priority was responding to residents' questions and concerns about the impact of vibrations and noise from the heavy machinery, and the safety of the emissions.

Compromises included stopping truck movements when parents and children walked past the site to and from school, and working with the EDL plant to accommodate local events, including a wedding. Flexibility was also used to lessen the effects on local tourism operators, such as reducing activity during the wharf cafe's busy lunchtime periods.

Roosen said the compromises were unique in his experience, as was having a residential street running right through the middle of the site. In the USA, Tahi Street would have been closed and the traffic re-routed, he said.

Another complexity posed by the Mapua site was the pattern of contamination – plugs of soil at different depths were pulled from a grid of hundreds of squares across the site. "Imagine dissecting a Rubik's cube and you kind of get a grasp on what the site excavation was like. We were working in a three-dimensional plane on up to five levels of depth," Roosen said.

In total, more than 60,000 cubic metres of soil was excavated, and a similar amount reinstated. More than 5000 samples were taken and analysed, with each identified and stored so that its stage of the remediation process could be accurately tracked.

A rotating screen separates refuse and debris from the soil and gravel in materials excavated from the site

John Roosen and Jenny Easton, TDC, discuss site monitoring

Remediation workers packing soil samples for the lab

CHAPTER 9

The outcomes

Something had to be done at the Mapua site to remove contaminants from the soil, groundwater and nearby marine environment.

Of greatest concern were organochlorine pesticides, which include DDT, DDD and DDE (collectively known as DDX), and aldrin, dieldrin and lindane (collectively known as ADL).

On-the-ground work to restore the site began in late 2004 and, nearly four years later, the TDC signed off the Certificate of Practical Completion (June 2008). The remediation Validation Report was submitted to the Ministry in December of that year and the final Site Auditor's Report in June 2009.

The clean-up was challenging. Located in the middle of a tight-knit residential community, and next to a sensitive estuary, it was difficult to manage the noise, dust and vibrations from the MCD reactor. The site's small size posed logistical challenges about where clean, screened and treated soil could be stored while work progressed.

Grass grows on the remediated site

Vineyards grow on private property that was also part of the remediated site

Adding to the challenge were the newness of the MCD technology, the fact the chemicals were no longer in use, and that no operation on this scale had been tried in New Zealand before. There were no New Zealand examples, standards or protocols to follow, such as validation protocols, blood and health monitoring standards, or emissions sampling standards.

The complexity was compounded when Thiess pulled out and the Ministry became project manager and the resource consent holder. This caused some issues. For example, as a Crown agency, the Ministry was immune from any enforcement action by the TDC – s4(7) of the RMA at the time specifically excluded local authorities from issuing abatement notices, enforcement orders, excessive noise directions or information against the Crown, despite the TDC's Peer Review Panel recommending action on more than one occasion. Although resource consent conditions were allegedly breached a number of times, TDC issued only one abatement notice during the whole project – when EDL did not cease work on Sundays. Other non-compliance issues were sorted out through the site contracts.

The Ministry's location in Wellington at a considerable travelling distance from Mapua was one other source of frustration for locals and site workers.

Despite all the challenges, an independent environmental audit, commissioned by the Ministry, and published in 2009, found that the remediation work by-and-large had achieved its aims.

The audit looked at nine separate areas within the clean-up site to check if the targets for each were achieved. For example, the western part of the site was intended to be used for residential housing, the eastern part was intended for commercial use and open space, and the former landfill area was intended to be recreational open space. The other areas were the foreshore and four privately-owned residential properties.

The auditors found the site was cleaned to meet the acceptance criteria in the resource consents, with the exception of marine sediments – which, with much tighter clean-up criteria, had been cleaned to the extent practicable. Although some minor issues remained with the eastern and landfill sections, the auditors said this was satisfactory provided that the site management plan for future land use was followed.

The Audit Report also recommended ongoing monitoring, including soils, groundwater, marine sediments and ammonia gas. Monitoring reports are available on the TDC and Ministry websites.

Protective coating on the estuary

Conclusion – Next steps

The Site Auditor's final report made a series of recommendations including ongoing site monitoring and that the site management plan for future land use was followed.

TDC has been monitoring the site since 2009 and the Site Auditor is currently reviewing its reports. Overall, reports to date show that the adjacent beaches and groundwater quality have improved and ammonia gas in the soil is no longer a concern.

TDC is currently investigating the feasibility of installing an underground sewage pump station on the eastern side of the remediated site, beside Aranui Road. It would have a carbon filter to eliminate any smells.

A condition of the Government's funding was that at least 40 per cent of the FCC site would remain as public land. This has led TDC, in consultation with the local community, to develop a waterfront park on part of the eastern part of the site.

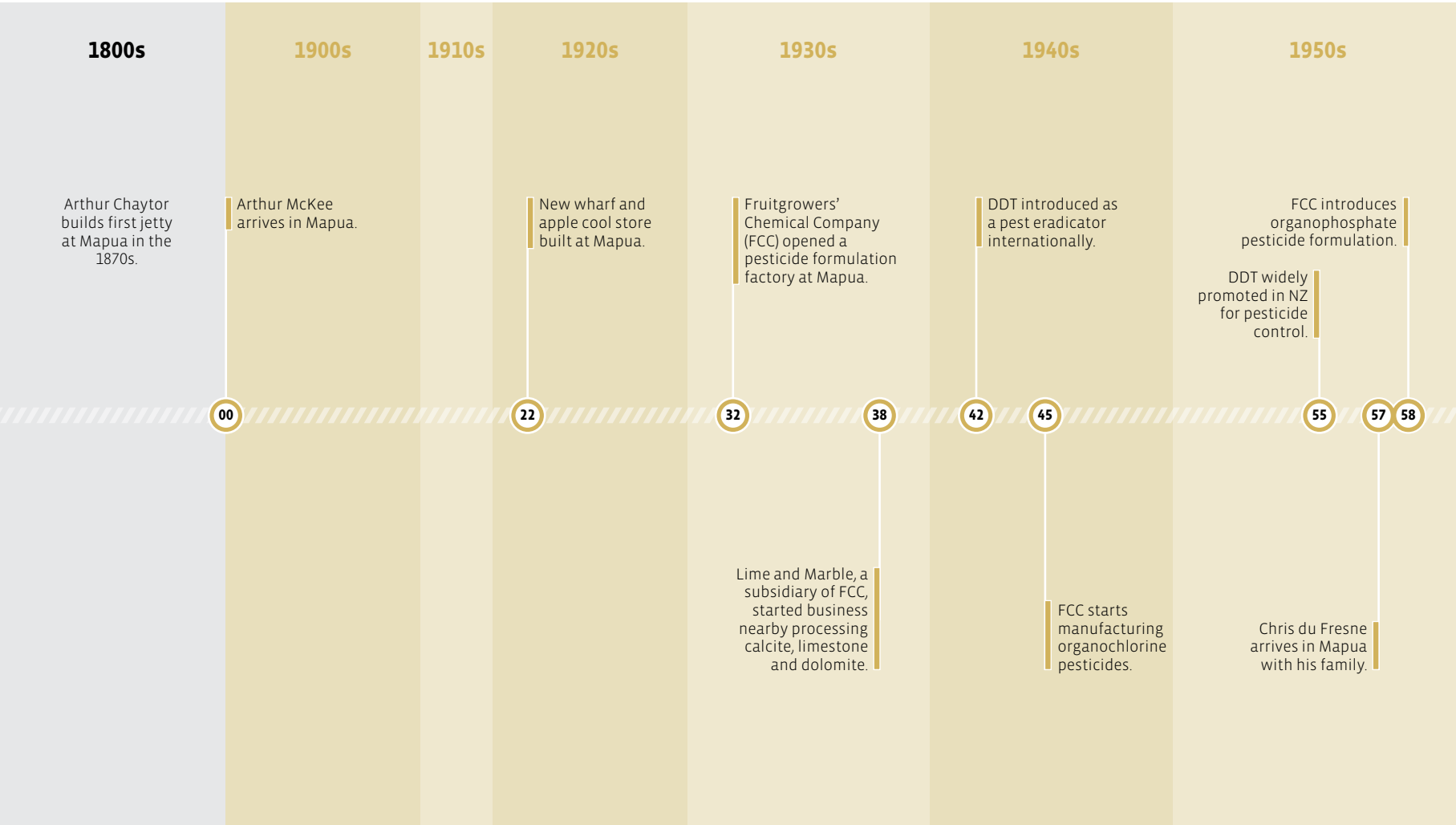
Local residents (and others) have been involved with the park's design. Work to date includes the completion of the car park, and the amphitheatre and promenade area close to the sea were opened early October 2011.

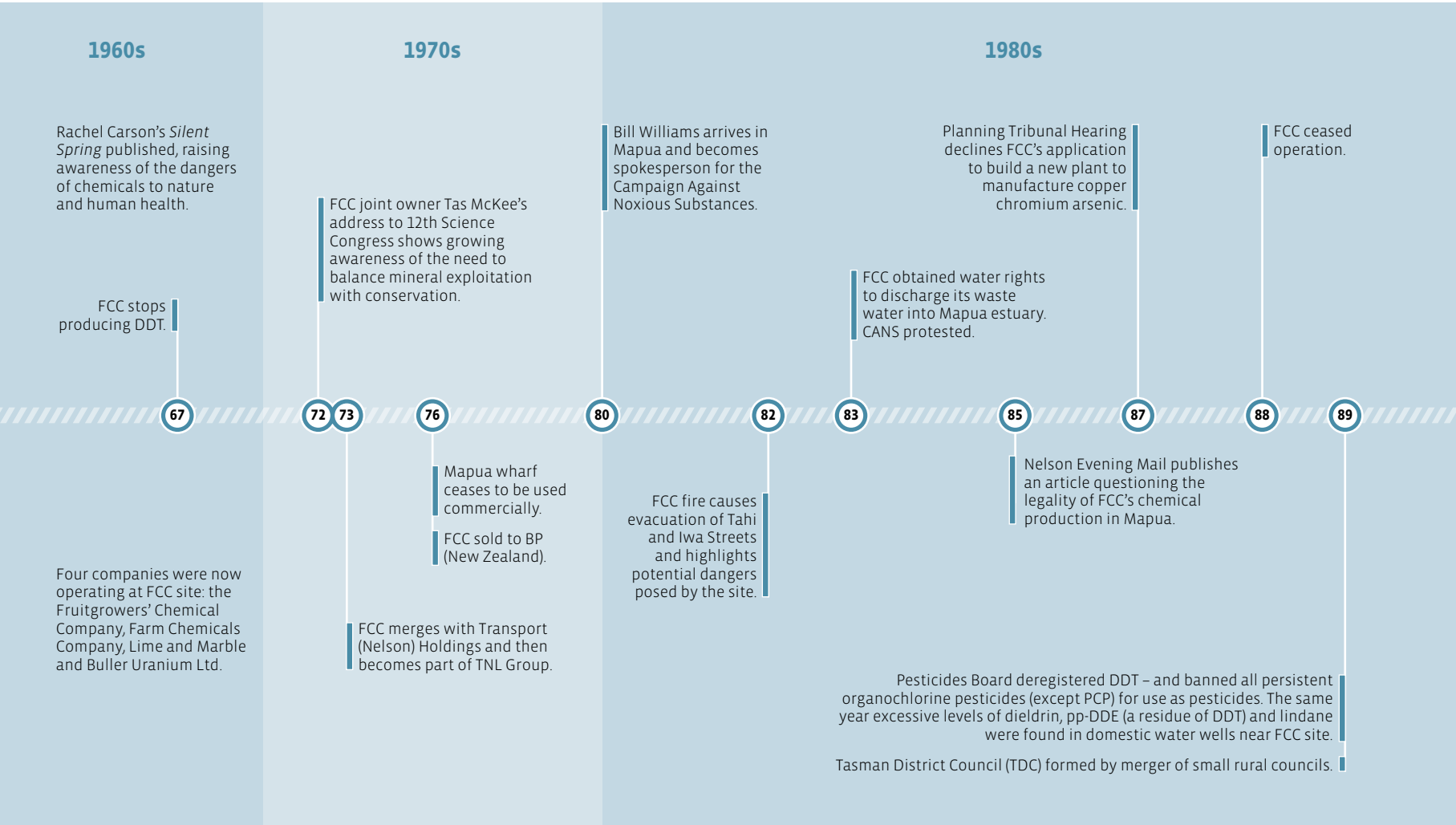
Meanwhile, the west side of Tahi St (FCC West) is now a large grassy paddock where local residents walk, fly their model planes and exercise their dogs. The decision of how to develop this land for houses has been postponed until the Mapua infrastructure (water and sewage) has been upgraded.

Many lessons were learnt from the clean-up of the FCC site at Mapua but it is fitting to end with the most positive one: impossible things can be achieved when a passionate community works alongside a dedicated council.

Phase 2 of Mapua Waterfront Park has now been completed and includes seating, boardwalks, planting and an amphitheatre

Timeline


1800s
1900s
1910s
1920s
1930s
1940s
1950s
Arthur Chaytor builds first jetty at Mapua in the 1870s.
00
Arthur McKee arrives in Mapua.
22
New wharf and apple cool store built at Mapua.
32
Fruitgrowers' Chemical Company (FCC) opened a pesticide formulation factory at Mapua.
38
Lime and Marble, a subsidiary of FCC, started business nearby processing calcite, limestone and dolomite.
42
DDT introduced as a pest eradicator internationally.
45
FCC starts manufacturing organochlorine pesticides.
55
DDT widely promoted in NZ for pesticide control.
57
Chris du Fresne arrives in Mapua with his family.
58
FCC introduces organophosphate pesticide formulation.


1960s
1970s
1980s
Rachel Carson's *Silent Spring* published, raising awareness of the dangers of chemicals to nature and human health.
FCC stops producing DDT.
67
Four companies were now operating at FCC site: the Fruitgrowers' Chemical Company, Farm Chemicals Company, Lime and Marble and Buller Uranium Ltd.
72
FCC joint owner Tas McKee's address to 12th Science Congress shows growing awareness of the need to balance mineral exploitation with conservation.
73
FCC merges with Transport (Nelson) Holdings and then becomes part of TNL Group.
76
Mapua wharf ceases to be used commercially.
FCC sold to BP (New Zealand).
80
Bill Williams arrives in Mapua and becomes spokesperson for the Campaign Against Noxious Substances.
82
FCC fire causes evacuation of Tahi and Iwa Streets and highlights potential dangers posed by the site.
83
FCC obtained water rights to discharge its waste water into Mapua estuary. CANS protested.
85
Nelson Evening Mail publishes an article questioning the legality of FCC's chemical production in Mapua.
87
Planning Tribunal Hearing declines FCC's application to build a new plant to manufacture copper chromium arsenic.
88
FCC ceased operation.
89
Pesticides Board deregistered DDT – and banned all persistent organochlorine pesticides (except PCP) for use as pesticides. The same year excessive levels of dieldrin, pp-DDE (a residue of DDT) and lindane were found in domestic water wells near FCC site.
Tasman District Council (TDC) formed by merger of small rural councils.

1990s

92 TDC constructed a clay bund along the Mapua estuary, and capped the old landfill with clay to stop chemical leachate.

95 Jenny Easton became TDC's site liaison officer for FCC site.

96 Ceres Pacific and Mintech paid TDC to take over their land titles on the condition that they would not be made liable for clean-up. The council had FCC buildings dismantled.

Site investigations were conducted, leading to the development of a resource consent application for a site containment strategy.

97 A resource consent hearing granted a consent for containment of the site but was appealed by Royal Forest & Bird Protection Society. The Government expressed its view that remediation was its preferred strategy.

99 The Government agreed to help TDC with funding, research and advice.

2000s

00 Mapua Residents' and Ratepayers' Association, canvassed community views for the future of site.

01 TDC awarded the remediation contract to Thiess, using the MCD remediation technology of Environmental Decontamination Ltd (EDL).

03 A resource consent application for remedial works was granted with amendments following an appeal by Greenpeace and the Royal Forest and Bird Protection Society.

04 In August, Thiess Services withdrew from the project and the Ministry for the Environment became the consent holder,. The Ministry re-engaged EDL with John Roosen as site manager.

EDL began remediation work in the Series II Mechano-Chemical Dehalogenation plant .

07 The last batch of contaminated soil was treated in July.

The resource consents expired and the responsibility for the site was returned to the landowners – TDC.

08 TDC signed off the Certificate of Practical Completion for remediation of Mapua site.

09 Final site auditor's report for remediation of Mapua site published.

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