Crime, Law and Social Change (2023) 80:287–306
https://doi.org/10.1007/s10611-023-10083-0

Silencing Paritutu

Sarah Monod de Froideville[1] · **Andrew Gibbs**[2]

Accepted: 24 January 2023 / Published online: 21 February 2023

Abstract
This paper exposes the New Zealand (NZ) government's longstanding campaign to silence evidence of health impacts from dioxin-containing emissions during the production of the herbicide 2,4,5-trichlorophenoxyacetic acid (2,4,5-T) in New Plymouth in the 1960s. Our analysis of official documentation and related literature between 1960–2005 reveals a series of investigations engaging various silencing mechanisms that have culminated in a case of historical pollution. By doing so, they have intensified the acute injuries, chronic disease and multigenerational impacts stemming from the emissions, while discounting the lived experiences of suffering. We argue that silencing be seen as an epistemic violence that is intertwined with, but stands in evidence of, actions to ignore and deny harms that could be utilized in securing the long overdue acknowledgement and appropriate assistance for the Paritutu community.

Keywords Silencing · Historical pollution · Epistemic violence · 2,4,5-T · Dioxin · Birth defects · Emissions

Introduction

In this paper we trace the NZ government's decades-long campaign to silence evidence of harm from historical emissions containing 2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD) during production of 2,4,5-T at the Ivon Watkins-Dow (IWD) Paritutu plant in New Plymouth, New Zealand (NZ). The campaign has been executed through a series of 'investigations' commissioned by the NZ government to prevent evidence of associated harm coming to attention that would undermine the agrochemical industry and by corollary the nation's dependence on the farming sector. Each inquiry has reported no relationship between the production or use of the herbicide and ill health or injury.

✉ Sarah Monod de Froideville
Sarah.monoddefroideville@vuw.ac.nz

[1] Institute of Criminology, Te Herenga Waka-Victoria University of Wellington, Wellington, New Zealand

[2] New Plymouth, New Zealand

However, each set of results is marred by one or more of the following: use of unrelated data; irrelevant tests; omission of key information; a corrupted research process. Consequently, those affected by the historical emissions have had to learn to live with the effects of TCDD poisoning across several generations while enduring the contempt of official refusals to acknowledge their lived experience. Our objective, here, is to expose the injustice of the NZ government's campaign, and to demonstrate the integral role that silencing played in the development of historical pollution in Paritutu. Furthermore, we suggest that silencing, as an epistemic violence, can serve as evidence indicative of the wrongdoing it is intended to keep hidden.

Silencing

Silencing refers to actions intended to hush, gag, or otherwise render voices mute (Jordan, 2012), by denying a speaker the lexicon, a platform, an audience or a response (or all at the same time) (Galván-Álvarezn, 2010). Silencing serves power (Taslitz, 1999) relieving the effort of denial and the burden of responsibility (Barton & Davis, 2018; Brisman, 2013; Cohen, 2001). Silencing fosters hopelessness and indifference through severing a harm from its perpetrator, leaving in its wake an obscured view of violence and victimisation (Barton & Davis, 2018; Brisman, 2013).

Cases of silencing in Global North liberal democracies are normally associated with corporate interests that are threatened by policies designed to improve public health or safety. Big Tobacco's attempts to quash the links between second hand smoke and lung cancer (Landman & Glantz, 2009); the NRA's curbing of research on gun control (Kellermann & Rivara, 2013); the Heartland Institute's discrediting of climate science (Kauth, 2020); and Monsanto's corruption of the peer review process to neutralize claims of glyphosate related harm (McHenry, 2018), are all key examples. Yet, as John Stauber – public relations critic and co-author of the 1995 book *Toxic Sludge is Good for You* – contends, people living in democratic states are routinely silenced by their elected representatives (Stauber, 1999). But it is a different type to that employed by totalitarian states (think Nazi Germany, or Nicaragua in the early 1980s). Democratic states employ a surreptitious silencing, designed by sophisticated propaganda professionals, articulated by presidents and prime ministers, and bought – wholesale – by rights-bearing citizens. The silencing we discuss in this paper is of this ilk.

Silencing that works by stealth can have impacts that extend through time. Efforts to mute women's voices, for example, begin with fairy tales about big bad wolves and unconscious princesses that function to warn little girls about the limits on women's freedom to move about alone, and of their invisibility without a man by their side (Crum, 2016). They normalize a culture in which women's safety is not guaranteed, where they cannot expect to be included on a par with men (Jordan, 2022). In settler societies such as NZ, Australia, Canada, and the United States prevailing Eurocentric structures are propped up by sanitizing stories of 'peaceful settlement' and that deny the atrocities deployed to force indigenous people from their lands and construct those who speak against them as extremists (Kidman, 2017). Neoliberal market freedoms also prevail by this manner, silencing dissent from their

logics by ensuring that no-one in the socio-economic hierarchy has a definite place (Mathiesen, 2008).

Silencing environmental harms

Environmental harms are shrouded in silence. In western, Global North cultures, they are also shrouded in science. This, as Fjelland (2021) contends, has silencing effects as the burden of proof in cases of environmental harm lies with the complainant, the victim, who will likely be ignorant of the medico-scientific vernacular essential for linking their injuries with actions (Louisson, 2021; Natali, 2017; Trundle, 2020; Ureta et al., 2020). Experience and observation are considered 'anecdotal', inconsequential, and invalid (Foster, 1999) when compared with biometric indicators and statistical inference.

Natali (2017) argues the deliberate pursuit of ignorance of environmental harm has become an embedded part of production processes in late capitalism (see also McGoey, 2012; Stanley & Day, 2021). Silencing efforts to this end include explicit acts, such as lobbying on behalf of powerful groups to shut down grassroots campaigns (Brisman, 2013); passing ag-gag legislation to prevent activists from exposing animal abuses by prohibiting them passage on farmed land (Skinner, 2021); and the murder of activists for speaking out against a particular harm (Global Witness, 2022). Labels help to silence the violence behind our consumptions. The 19th Century practice of burning forests to make way for agriculture, for example, was known as 'land-clearing', a verbalization that constructed ancient communities of trees, plants and bush animals as obstacles to progress (Byrnes, 2001). Language also reconfigures animal limbs and torsos into consumable wholes and parts: venison, veal, fillet, chop, side, and flank. These terms help to remove the moral repugnance that slaughtering sentient others would otherwise evoke (Goyes & Sollund, 2018; Pemberton, 2016; Skinnider, 2011; Sollund, 2013, 2017).

Our focus in this paper is silencing in relation to a specific category of environmental harm served by the passing of time: historical pollution.

Historical pollution

A case becomes historical pollution when the contamination becomes apparent sometime after the polluting events occurred (Rotolo, 2017). To what degree contamination can be connected to specific polluting events is a critical consideration in understanding why, and how, historical pollution materialises.

Each case of 'historical pollution' involves a complex set of circumstances that evolve across time and may over time draw other activities and entities into the fold. For example, soil pollution can become a problem of groundwater or of food grown within it (Rotolo, 2017). Priorities can shift as the tools of measurement become more sensitive and as the hierarchies of knowledge are reconfigured (Rotolo, 2017). The interplay with time can also reveal and exacerbate cracks in the social fabric. East/west neighbourhood population patterns have emerged across both Europe and

North America in relation to prevailing winds that carry factory pollution eastward (Heblich et al., 2021). In 'Cancer Alley', Louisiana, descendants of slaves live in a perpetual state of injury, sick from the chemical dumps of their petrochemical industry neighbours. The US government, who has failed to regulate the industry's waste processes, re-enacts the brutality of the 'Old South' plantations for this generation through a different savagery: a slow violence Davies (2018) identifies as 'letting die.'

The scale of the industrial past in the Global North means that virtually every one of its countries will eventually have to reckon with historical pollution, for which the following questions will be pertinent: Who is responsible? How is this to be dealt with? What does justice entail? What level of 'risk' remains tolerable? (Centonze & Manacorda, 2017; Natali, 2017). Natali (2017) argues each case of historical pollution is made up of a geographical dimension (the site, the land), and a conceptual dimension (social and political awareness/acknowledgement). Without the latter, the former remains where most cases currently exist—in the twilight zone of an ignored geography (Natali, 2017). Silencing, when present in a case of historical pollution, is a conceptual feature that is *intertwined with* the geographical dimension insofar as it obstructs awareness and acknowledgement and therefore the potential for remedial actions. Where so, silencing can intensify harm associated with the polluted geography by narrowing the opportunity for victims to establish the cause of their injuries (Ninnes, 2004).

Silencing may, however, then serve in evidence of that harm. Dotson (2011) argues that evidence of silencing can be observed in, and conceptualised as, a failure to respond in a linguistic exchange. When one party refuses to engage with, include, acknowledge, or recognize another party, that party is discounting the second party's capacity to interpret meaning from the world and make sense of their lived experiences (Herzog, 2018). Silencing in this sense constitutes an epistemic violence that denies a person's sovereignty over their physical and emotional wellbeing (Dotson, 2011; Pemberton, 2016). Silencing in cases of historical pollution therefore inflicts its own injury over and above that from its conceptual entanglement with a contaminated space. And that it does means it that it can speak of the matter which is silenced (Emson, 1999).

Our focus is a case of historical pollution featuring silencing conducted by the NZ state. We will establish that the NZ government is responsible for ensuing harms suffered and therefore must engage a process toward justice.

Silencing Paritutu

The silencing targeted evidence pertaining to early and unmonitored exposures to high levels of TCDD from the production of 2,4,5-T at the Ivon-Watkins-Dow chemical plant located in the Paritutu area of New Plymouth, on the west coast of NZ's North Island, between 1960 and 1970. Local iwi Ngati Atiawa gave the name Paritutu to a high rock column formed by volcanic activity located near the western coastline of New Plymouth. It would become one of the Māori names that 'stuck'

despite Pākehā efforts to Anglicise land names during colonisation (Keenan cited in Harvey, 2020).[1] It could be said, then, that Paritutu refused to be silenced.

The substance 2,4,5-T is a phenoxy herbicide that was developed in the 1940s. It works by promoting rapid growth in a plant, stressing it to the point it effectively commits suicide. Initially celebrated as a wonder chemical that would revolutionise agricultural production, it quickly became a topic of controversy (Wildblood-Crawford, 2008). Critics were not concerned with 2,4,5-T per se, but with TCDD, a contaminant formed in the production of the herbicide's precursor TCP. Amongst its chemical group, TCDD is considered the most potent and dangerous compound. It binds to the aryl hydrocarbon (AH) receptor, which has an important regulating role in many biological functions. From 1969 it was known to be fetotoxic and teratogenic, is considered carcinogenic (IARC, 1977a, b), and has been associated with systemic injuries (from hypothyroidism to Parkinsons Disease) persisting across generations (Gaspari et al., 2021). In addition to its role in domestic agriculture, 2,4,5-T was used as a military defoliant in Malaya, and later, when combined with another phenoxy herbicide, 2,4-D, it became Agent Orange (AO), the tactical herbicide used during the Vietnam war.

New Zealand was one of the most prolific users of 2,4,5-T from the late 1940s through to the 1980s, largely for the control of gorse and clearance of Manuka that precipitated erosion on steep hill country areas. It was also the last country in the world to produce the herbicide, with operations continuing at IWD's plant until 1987. But it is 1950s and 1960s production of 2,4,5-T that is thought to have contained high levels of TCDD, with estimates varying from 6.2 ppm (Firestone et al., 1972) to 30 ppm (IARC, 1977a, b; see also Pilgrim, 1986). There was minimal governance of the agrochemical sector in NZ at this time, partly as chemicals were not viewed in terms of potential risks but rather for their capacities in assisting human activities (Wildblood-Crawford, 2008). There was also a global shortage of the herbicide as the U.S. had exhausted supplies to put toward their efforts in Vietnam. Wildblood-Crawford (2008) explains that this meant that chemical industry opportunists, most of whom employed a fast production process that resulted in a product with a high TCDD level, were able to temporarily establish themselves as producers. Until 1969, IWD imported TCP, the precursor component of 2,4,5-T that is the source of TCDD (Wildblood-Crawford, 2008).

Those who lived in Paritutu during this period recall curtains disintegrating; days when a mysterious foam would appear on the lawn; plants that would suddenly die for no apparent reason; waste plumes running into the sea; and an overpowering, pungent chemical smell wafting from the direction of the IWD plant (Campbell, 2014). Women who lived in the neighbourhood have recalled multiple miscarriages, stillbirths, and babies were born with both physical and intellectual disabilities (Fisher & Bartle, 2006). The rates of early onset cancer amongst this population also were, and continue to be, high (O'Connor, 2001). Yet, the NZ government has consistently held the position that there is no evidence to suggest that 2,4,5-T causes

[1] 'Iwi' is the Māori term for 'tribe'. Ngati Atiawa have ancestral ties to Paritutu and the wider New Plymouth region. Pākeha is the term that, when used in this context, refers to the British colonizers.

harm to human beings, despite evidence that maternal TCDD exposure causes stillbirths and birth defects in tested animals (Mann, 1972; Wildblood-Crawford, 2008). It has denied any link between emissions from IWD's operations, and the reproductive anomalies and premature cancer experienced by Paritutu residents. We demonstrate, however, that the NZ government's 'no evidence' trope is a product of a silencing campaign to conceal the fact it willingly put the NZ public at risk of harm from a herbicide containing high levels of a potent toxin, and those of Paritutu at risk from that herbicide's production.

We are not the first to identify silencing with regard to harms associated with 2,4,5-T (see for example Ninnes, 2004; Wildblood-Crawford, 2008). Nor are we the first to identify the NZ government's participation in "dark arts of mass persuasion" (Vallée, 2021, p. 390) with respect to agrochemicals and other environmental issues (see for example, Hager & Burton, 1999; Hendy, 2016; Joy, 2021; Louisson, 2021; Monod de Froideville, 2022; Wilson & Horrocks, 2008). We are, however, the first to trace silencing in official discourses regarding the problem of TCDD emissions, to consider it integral to the development of a case of historical pollution, and to argue that the evidence of silencing upends the 'findings' used to suggest that there was no harm done. As stated, it is our intention in this paper to expose the NZ government's silencing campaign and its multimodal violence against the people who lived in Paritutu.

Method

The argument we develop here forms part of a larger case-study investigation into the dioxin issue and IWD's operations in Paritutu. Natali (2017) posits that single case study analysis of historical pollution allows researchers to consider developments over time, from the original polluting events to the environmental injury that presents itself in the present, to the potential for harm to be experienced in the future. By doing so, researchers can be sensitive to the ways in which cultures belonging to particular times and places are important in shaping understandings of pollution and its effects. A case study tied to a particular geographical point helps facilitate in-depth understandings of the context of the case in question (Natali, 2017).

This paper originated in a meeting between Monod de Froideville (first author), a criminologist commencing an exploration of events in Paritutu, and Gibbs (second author), who has occupied a dual role as researcher and advocate for the affected Paritutu community for well over 20 years. The research was co-designed to be a critical analysis of 2,4,5-T related official documents and grey literature focused on the NZ context and produced after 1959. The data sample was sourced from Alexander Turnbull Library; Archives New Zealand; Taranaki District Health Board (TDHB); the Ministry of Health; and official communications retrieved under NZ's Official Information Act 1982. Our documentary analysis was deductive and investigative, purposefully intended to expose the silencing practices that have wreaked suffering in the lives of residents of Paritutu. The analytical process involved identifying and appraising each official document for evidence of silencing activity or impact (with silencing understood to be action employed to mute, deny, discredit or

distract from) (Bowen, 2009) and multiple, lengthy readings, akin to taking 'a long soak in the data' (Hall, 1975) by us both.

We need to make plain that there was a broader context of silencing in relation to IWD's operations of which the trajectory identified here is just a part. Indeed, Paritutu is a case of historical pollution that has been shaped by varying modalities of silencing. In this paper we present the pattern that can be seen across the NZ government's investigative efforts to silence evidence of links between historical exposures to TCDD and adverse reproductive and health outcomes.

Results

Henderson, Westown Maternity, and the ACB

One of the first alerts that there might be an issue with the production of 2,4,5-T at the IWD plant came from the Matron of New Plymouth's Westown Maternity Hospital Hyacinth Henderson, who had observed a sudden increase at that time in the number of babies being born with birth defects. She notified what was then the Department of Health (DoH) to this effect. The DoH responded that their monitoring system, which comprised of voluntary notifications of birth defects, showed no such increase nor increases in any district in New Zealand, and hence any 'increases' was due to her hyper-vigilance (DoH, 1966). Henderson began to record her observations, and she asked the hospital photographer to capture all deformities on film so that there would be a visual source for later reference. The hospital did not retain the visual record, however. Henderson was given an album containing the photographs when she left New Plymouth in 1971. It would be 30 years before she would bring them to attention once again.

Questions about the safety of 2,4,5-T use were also beginning to emerge in the late 1960s in relation to continued use of AO in the Vietnam war. As Butler (2005) explains, results from the Bionetics study suggested 2,4,5-T caused birth defects in laboratory animals. The concerns of US scientists grew as doctors in Vietnam reported increases in spontaneous abortions and birth defects concentrated in the areas most heavily sprayed with AO (see also Sterling, 1972). In 1970, U.S authorities adopted a precautionary approach and placed restrictions on the domestic use of 2,4,5-T as well as a halt on their use of defoliants in Vietnam.

Letters between the US embassy agricultural attache and the Agricultural Chemicals Board (ACB) show that NZ government was made aware of the Bionetics' findings and the likelihood of restrictions to follow, in November of 1969 (Loveless, 1969, 1970; Thompson, 1970). For NZ, however, the timing could not have been worse. Some months earlier, the government had introduced a subsidy for agrochemicals as part of a plan to stimulate production in the primary sector. Any restrictions imposed would not only be an about face, but it would also undermine the anticipated increase in agricultural exports that were critical to NZ's GDP. The official line became that 2,4,5-T was safe pending proof of harm caused (Mann, 1972). Maintaining this position would require careful management on behalf of all parties who stood to benefit. To that end, the NZ government prepared itself to

investigate future claims of harm. A letter to IWD from the ACB in January of 1970 appears to pledge the government's continued support for the company:

> The Board must take, and appear to take, any necessary action to ensure that agricultural chemicals are used safely. The Board must be able to say that it investigates cases of hazards and alleged hazards. (ACB, 1970)

The chairman of the ACB, P. J. Clark, would afterward attribute criticism levelled at 2,4,5-T to an emotionally unstable NZ public ("Ivon Watkins-Dow", 1975). Later, it was discovered that all records relating to 1960s investigations conducted following complaints about airborne releases into residential areas and liquid wastes running through parks and onto beaches had been destroyed (P. D. Matthews, personal communication, 1989, April 7).

These moves failed to silence the problem, however. By the early seventies, the DoH had reported an increase in birth defects occurring between 1965–1970 across NZ and in New Plymouth specifically. The Director of Public Health would dismiss these increases on the basis that they were derived from a register of voluntary notifications ("Ivon Watkins-Dow", 1975). Yet death certificates show that there *was* an increase in female stillbirths in Paritutu, peaking in 1970, and a statistically significant cluster of cases of anencephaly between 1968–72, neither of which has ever been acknowledged by regional or national officials. What is more, a farmer in 1967 had reported that following spray operations he had found 54 dead calves from a herd of 120 and another herd with multiple mummified calf foetuses. A dog breeder had also notified authorities about puppies born without eyes or legs following spraying ("Ivon Watkins-Dow", 1975). However, it was only after two GP's practicing in the Waikato region's farming community raised the issue that the ACB felt compelled to initiate an investigation.

Sare and Forbes, Seveso, and the Department of Health study

In 1972, the NZ Medical Journal published a paper on the potential teratogenic impacts of 2,4,5-T authored by the two GPs (Sare & Forbes, 1972). The paper reported on a case of two female patients who had each given birth to babies with myelomeningocele (a variant of spina bifida). The case had drawn their attention as the women lived adjacent to each other and spraying of 2,4,5-T had occurred close to their homes during their pregnancies (Sare & Forbes, 1972). Their suggestion that 2,4,5-T was responsible prompted the ACB to appoint a subcommittee to investigate potential teratogenic effects from the herbicide. In the interim, two more women from the South Island reported giving birth to deformed babies after agricultural spraying occurred near their homes, followed by another two with babies born with facial deformities, this time from the Taranaki region ("Ivon Watkins-Dow", 1975).

The subcommittee nevertheless focused their investigation on the GPs' case study. Noting a lack of information pertaining to a relationship between 2,4,5-T use and birth defects at that time, they summated that there was 'no evidence' of a relationship and hence continued use of the herbicide was appropriate (ACB, 1972). It was conceded however, that harm was possible in some unusual scenarios. Their

report proposed that the two women that were the focus of the GPs' paper had deformed babies because they had engaged in atypical activities (both had assisted their husbands on their respective farms during spraying operations) (ACB, 1972). The subcommittee recommended an analysis of birth defect records be conducted to compare rural and urban notifications, and, for vigilance to be practiced in the interests of keeping abreast of any aberrances. Notifications to the birth defect registry would remain voluntary, however (and so the data would continue to be unreliable). Finally, the subcommittee proposed that a warning be placed on 2,4,5-T packages sold to the public alerting women of childbearing age to avoid contact with the herbicide, thus transferring the responsibility for managing the risks of 2,4,5-T related harm to prospective mothers (Wildblood-Crawford, 2008).

The issue of birth defects from chemical production processes became topical again in 1976 following an industrial explosion in Seveso, Italy which involved a significant release of TCDD. When responding to the fallout, authorities in conservative, catholic Italy temporally legalised abortion to allow women who lived or worked in the vicinity of the explosion to terminate their pregnancies ("Exemption on Abortion", 1976). Their doing so was an acknowledgment that airborne TCDD posed a danger for the developing foetus.

In December of the same year, the Parliamentary Commissioner for the Environment offered to do a comparison between rural and urban birth defect ratios for the DoH. The Department's officials declined his offer. The renewed attention on the issue called for a response, nevertheless. To that end, the DoH conducted their own study, but not one that would analyse birth defects in rural areas or in Paritutu during the period of high TCDD dispersal. Instead, the study investigated three 'clusters' of NTD defects that had been reported from across the North Island in the mid 1970s, a time when the levels in 2,4,5-T had been reduced to less than 0.1 ppm. The investigation did not test for TCDD exposures in the cluster individuals or archive samples for testing but relied instead on interviewee recalls of direct exposures during their first trimesters of pregnancy. It also dismissed reports suggesting food chain exposure pathways (Baughman & Meselson, 1973) while failing to consider female specific exposure routes such as washing 2,4,5-T saturated work clothing in surfactant-based detergents.

The DoH study would report that it had found 'no evidence' of a relationship between birth defects and 2,4,5-T use, noting a lack of exposure in the first trimester of pregnancy for most of the Taranaki cases (DoH, 1977). It was a conclusion that would serve to discount claims from the NZ public while undermining the implicit messaging of the Italian government's temporary abortion policy. The study also shifted the focus firmly back to the contemporary use of 2,4,5-T nationwide, away from the historic operations of IWD's plant in Paritutu.

Vietnam veterans, Agent Orange, and DOW

In 1979, Vietnam veteran groups filed a class action lawsuit against the DOW company and six other suppliers of AO. Around the same time, the US issued an emergency suspension on the use of 2,4,5-T after studies in the state of Oregon

reported it strongly associated with incidences of miscarriage. In March of 1980, the EPA held a series of hearings on the potential cancellation of 2,4,5-T in the US market. The EPA also funded revaluations of DOW rodent studies that would find an insufficient safety factor for general population exposures in sprayed areas and that TCCD doses at the parts per trillion (ppt) level caused increases in early anencephaly. These events were intimately linked with the issue of 2,4,5-T use and production in NZ. In June, 1980, one of the members of the subcommittee, Professor E. G. McQueen, wrote a letter to the Minister of Health requesting permission to give evidence in the US EPA hearings as a toxicity consultant on behalf of DOW. The letter also reveals McQueen's commitment to the continued use of 2,4,5-T in NZ:

> It is essential that unfounded allegations concerning valuable pesticides such as 2,4,5-T be rebutted. Apart from the highly deleterious effects on NZ's economy that would result from the withdrawal of 2,4,5-T, the precedent set would encourage the resolution of such issues on a basis of emotion and irrational prejudice rather than established fact. (McQueen, 1980)

McQueen concludes his letter explaining the content of an enclosed draft of the testimony DOW's lawyers had written for him to give when he appeared in court. However, the testimony states that it contains his personal claims only (Direct testimony of Dr. E. G. McQueen, 1980). He continues to mislead as he asserts that the several episodes of reported 2,4,5-T related birth defects in NZ had been 'thoroughly investigated'. He then proceeds to overview the position of the ACB following the US restrictions on 2,4,5-T, the inquiry of the subcommittee and the DoH's 1977 study in turn, stating in the closing remarks that collectively they found no evidence of any adverse health impacts from the use of 2,4,5-T in NZ (Direct testimony of Dr. E. G. McQueen, 1980). He does not mention the anencephaly cluster in Paritutu between 1968–72. In the latter half of his testimony, he attacks the EPA's restrictions on 2,4,5-T, which he argues were adopted against the advice of their own scientific advisory committees (Direct testimony of Dr. E. G. McQueen, 1980). He does not discuss that prominent scientists had discredited that advice on the basis that it had assured there were 'no effects' from low doses of dioxin when the testing had not been able to conclusively demonstrate that to be the case (Mann, 1972). Hence, McQueen actively constructed an account that favoured 2,4,5-T.

The veterans' case against DOW and the other companies would be settled out of court in 1985 for $180 million. Nevertheless, DOW representatives insisted that their company was not responsible for injuries related to AO, claiming they had warned the US government of the high dioxin content in the herbicide produced during the war (Nelson, 1990). Sills (2014) argues that the US government was aware that any suggestion they were culpable for AO related harm could result in a multi-billion-dollar compensation bill. To avoid this scenario, they commissioned a series of epidemiological studies of veterans to identify possible dioxin-related harms. The studies' small samples found nothing conclusive and became the basis for US officials to state there was *no evidence of harm*. Sills (2014) was part of the legal team for the Veterans in their class action suit and has seen the case files that were sealed immediately following the settlement. He claims:

> Denial reigned supreme. Any evidence (and there was plenty) showing that herbicides were counterproductive and causing enormous, unanticipated harm was simply brushed aside. Even worse, the chemical industry and at least a few government scientists knew that these compounds contained a hidden, extraordinarily toxic contaminant, and they kept that information secret. (Sills, 2014, p.13)

DOW's withdrawal from the hearings and subsequent allegations that US officials had known about TCDD's toxicity while AO was being deployed in the Vietnam war raises questions about both the content and utility of McQueen's testimony. That it omitted the Paritutu anencephaly and female stillbirth clusters and was endorsed by the DoH potentially implicates the NZ government alongside the US administration in the denial of harms associated with AO use in Vietnam. At the same time, it spoke about 2,4,5-T that was said to have contained low levels of TCDD. This raises a critical question around its relevance for DOW's defence in relation to AO.

Explosion at Ivon Watkins-Dow and the Brinkman Inquiry

On April 15, 1986, there was a blow-out at the IWD TCP plant. An incorrectly installed disc ruptured, releasing TCP and TCDD liquids onto the plant's floor. Some airborne vapours were also released. IWD was subsequently prosecuted for violating the Clean Air Act 1972 and would plead guilty to a breach of licence and failure to maintain equipment. However, the NZ government was once again facing questions from the public, this time squarely fixed on the problem of emissions, both past and present. To address these questions the government established a ministerial inquiry to consider the potential for harms from IWD's operations from both the leaked vapours and historical emissions. The Brinkman Inquiry, as it was dubbed after its chairman Professor G. L. Brinkman, released a main report in 1986 and a supplementary report in 1987, both of which barked out the by now predictable 'no evidence' trope (Brinkman, 1986).

Yet, like the DoH study and the US government studies of veterans, the Inquiry had ensured that nothing *would* be found. Its research team had tested the blood of residents and IWD workers for 2,4-D and 2,4,5-T (Brinkman, 1986). However, 2,4-D and 2,4,5-T were not released in the 1986 Incident. The 18 workers directly exposed to the TCP/TCDD release would wait 23 years to be told their mean 2007 serum TCDD was 37.9 ppt, over four times the levels of nine NZ 2,4,5-T sprayers who were tested in 1988 (Collins et al., 2009; Smith et al., 1992). The report's defensive narrative also focuses on public concern as a problem (and not the issue of vapours and emissions), which it attributes to irrational beliefs, anti-science sentiment and a sense of 'dread risk' linked to the controversy over AO. It attempts to normalise the risk of TCDD by associating it with activities endemic to modern industrialised living[2]; to discount it by arguing multiple overseas studies have failed to find 'proof' of

[2] Describing, for example, the fatality rate per million people for everyday activities (such as playing football and travelling by plane).

dioxin related harms; to distract from it by claiming that leaded petrol, as a source of dioxin in NZ, posed a potential hazard far greater than that of 2,4,5-T. It also justifies the continued use and manufacture of the herbicide citing NZ's particular problem with weeds and the impact of insecure income on farmers. It contains very little discussion about the release of vapours at IWD's plant, in particular the submission by the region's Air Pollution Officer Ron Pilgrim which contained critical information pertaining to historical operations at IWD. Pilgrim (1986) had submitted results of residential soil tests several hundred metres east of IWD that demonstrated soil TCDD levels exceeded those found in Seveso's Zone B.[3] In his opinion the principal source of TCDD in soils was 1960s airborne releases (Pilgrim, 1986). It is also worth noting that the Acknowledgments section of the report makes a specific mention of the assistance offered to the Inquiry by IWD's senior management, and that a later meeting between the Inquiry, government officials and IWD personnel agreed to decline an offer to conduct dioxin tests for New Plymouth mothers.

Henderson, O'Connor, and the serum study

The period we turn to now is the early 2000s. At this point, the Paritutu community and its supporters had secured the support of the Ministry for the Environment and the Minister of Health to test residents' blood serum for TCDD levels. Following extensive media coverage about the proposed tests, Hyacinth Henderson, now living in Otago, was compelled to make her observations of birth defects at Westown Hospital between 1965–70 known to authorities for the second time (Wildblood-Crawford, 2008). She contacted Patrick O'Connor Taranaki's Medical Officer of Health, who in turn would initiate two separate studies.

O'Connor's first study cited community concerns over high rates of 1960s and 70 s birth defects in New Plymouth, the same period Henderson was making her observations, yet examined rates between 1988–1999, *18 to 29 years after Henderson's data was collected* (O'Connor, 2001). It also examined rates of significant illnesses amongst recent residents, rather than from residents who lived in the area when emissions were harmful (O'Connor, 2001). Its results therefore bore no relevance to the problem of historical emissions. Despite so, the TDHB released a statement to the media claiming that the results confirmed that there was 'no evidence' to indicate a relationship between adverse health impacts and the historical production of 2,4,5-T at IWD's plant in Paritutu (Humphreys, 2001). The second study compared the rate of 1965–72 neural tube defects at Westown Maternity with rates recorded by other public hospitals around the country. Higher rates *were* found in Paritutu but O'Connor (2002) dismissed these as uncertain, concluding that it was not possible from the information he had before him to determine a link to IWD's operations. Incidentally, when officials at the TDHB became aware of Henderson's photographs they requested she hand them over for destruction (Brett Parradine,

[3] Zone B was an area designated as the second most contaminated land space following the Seveso explosion.

personal communication, 2002). It was Gibbs, this paper's second author, who delivered them on behalf of Henderson.

Nevertheless, the earlier proposed investigation into Paritutu residents' dioxin exposures by blood serum testing was to be going ahead. The objective of 'the serum study' was to establish whether dioxin levels in residents' blood, particularly those who had lived there during the 1960–1972 high TCDD 2,4,5-T predicted exposure period, were in fact higher than those found in the general NZ population. The study would not only produce evidence of high exposures but also reveal the lengths to which the NZ government was prepared to go to ensure such evidence was kept from the public.

In 2001, the Institute of Environmental Scientific Research (ESR), a crown entity organisation charged with providing scientific research for NZ communities was contracted to undertake the serum study. The research would consist of two phases: Phase 1 was to involve extensive consultation with stakeholders and residents to agree on the design of a report and select and test individuals with potentially high exposures; Phase 2 would take venous blood from selected participants followed by toxicological and comparative analyses.

ESR submitted an interim report to MoH with serum analysis results from the first group of 24 predicted high exposure subjects who were residents of Paritutu between 1962 and 1975 in July 2004. The data showed that individuals who were living in Paritutu by 1967 had a mean serum increase seven times the increase of those who arrived from 1968 on. Those who were adult age at their first exposures had mean increases 8.8 times that of those who arrived after 1967 and a mean 2004 serum TCDD increase of 11.5 ppt above background levels (Fowles et al., 2004a). Their levels were therefore comparable to those found of residents in Seveso's Zone B, and of people who had significant contact with Agent Orange during the Vietnam war. By contrast, individuals who had started living in Paritutu after 1968 had an average serum TCDD increase of 1.3 ppt above background levels (Fowles et al., 2004a). The report also stated that the elevated pre-1968 levels and the non-elevated post-1968 levels were grouped together for statistical analysis as per the study design, despite that doing so diluted the true magnitude of the highest observed exposures (Fowles et al., 2004a).

The interim report was then resubmitted again a few weeks later. The new version had been substantially revised insofar as it grouped (and compared) participants by their length of residence rather than period of exposure, and consequently made no mention of the highest exposures being associated with the earlier period. The results for 13 participants with ≥ 20 years residence (mean value of 14.9 ppt) was compared with results for 11 participants with < 20 years residence (5 ppt), showing a three-fold elevation for the first group (Fowles et al., 2004b). This was deliberate action to justify retargeting Part II of the study at later periods of residence—from 1973—1987. Retargeting meant further participants would be required, participants for whom it could be safely assumed would have much lower TCDD levels than the ones presented so far. Officials then proposed to combine the results of the new recruits with that of the first group of 24 to make one overall sample of 52 (S Gilbert personal communication to ESR, July 30, 2004). As it stood, three participants had already been grouped for comparison incorrectly. Two had been placed in

the ≥ 20 years residence (but had < 20 years residence), and one had been placed in the < 20 years residence (but had ≥ 20 years residence) (Fowles et al., 2004b). Without this 'error' the ≥ 20 group had an elevated mean TCDD level only 1.9 times that of the < 20 years group.

ESR's team opposed MoH's intention to combine results from Part I with those of the proposed Part II on the basis that the outcome would misrepresent the data and provide a misleading picture. They advised MoH that the Part I results should be released given the research objective had been met. In response, MoH attempted to block said 'premature' release claiming the results could lead to 'unwarranted concern', and insisted ESR conduct the second round of tests with participants who had lived in Paritutu between 1973 and 1987 (S Gilbert, personal communication, August 5 2004). Following ESR's counter insistence that the first group of results be released regardless, urgent meetings were called to plan for the expected fallout. ESR's interim report was noted to raise 'potentially complex compensation issues' and that MoH had assembled a team to 'manage ensuing risks' that included carefully controlled PR with key stakeholders such as TDHB, community groups and the media (Cabinet Policy Committee, 2004).

When the final report of the serum study was released in 2005, it claimed that no period stood out as a time that evidenced higher emissions and that there were suggestions from results in Part I that 'duration of residence' was the key variable (Fowles et al., 2005). The Part II mean for TCDD levels was calculated as 14.6 ppt (long term residency, now determined as ≥ 15 years) vs 3.2 ppt (short term residency, now determined as < 15 years), confirming the stated hypothesis (Fowles et al., 2005). It is, however, a predetermined finding based on manipulated data. Tellingly, the ESR team that conducted the research published a revised paper in 2009 on the serum study that now identified elevated TCDD concentrations in residents of Paritutu before 1968 (Fowles et al., 2009). That the MOH knowingly endorsed the 2005 serum study and continued using an outdated report with incorrectly grouped and falsified data as 'evidence' is evidence itself—of deception.

Discussion

Silencing introduced the variable of time in Paritutu, and time, in turn, became silencing's accomplice by transforming the acute violence of reckless action into the slower horrors of cancer and degenerative disease (Davies, 2022). Yet time would also become a threat to silencing efforts as it escorted new testing transparencies into the claims arena. In this way, silencing incentivised further silencing. Therefore, although relations between silencing and time were unfixed in Paritutu, they nevertheless remained central to the historical status of the polluting events. Each passing year produced stakes that were higher: intensified injuries; longer periods of suffering; and new generations of victims.

The Paritutu case also demonstrates state willing to weaponize science, a sobering reminder in the context of a global pandemic with evolving certainties and curbed freedoms that science is a human instrument, performed by people with interests within contexts. We endorse recent calls for increasing scientific literacy,

to have uncertainties made transparent, and for communities to have a stake in studies that directly affect them (Crichton, 2020; Fjelland, 2021). Alongside these calls are debates amongst critical scholars as to what counts as reliable data (Scott, 2016; Trundle, 2020). We have proposed that silencing simultaneously supports, commits, and speaks of violence in cases of historical pollution. That while the effects of pollution are often progressive, difficult to prove, and open to interpretation, because silencing is interwoven with the ontology of historical pollution through its introduction of time, evidence of silencing is also indicative of that it targets. We identified silencing in the Paritutu case across five points in historical time. We demonstrated how each instalment featured one or more claims of harm followed by an official investigation. We observed that each investigation found no evidence of harm, and that this was an outcome that in every case was propagated by one or more of the following silencing mechanisms: i) a diverted focus (for example, on *the use of* 2,4,5-T not *the production of*); ii) discountable data (from an unreliable source, or a population with low and or background exposure only); iii) omission of key information (and misleading statements); v) drawing of spurious associations; vi) manipulation of data; and vii) misrepresentation of findings. It is our position that these mechanisms testify to the harm that has ensued, in part because they were active in bringing it about. Though IWD may have been the source of the contaminating TCDD, the responsibility for historical pollution in the case of Paritutu lies squarely with the NZ government.

Davies (2018) argues that slow violence, typical of historical pollution, is best understood using situated knowledges and slow observation, akin to that we described of Gibbs' insider status in Paritutu. In case study analysis, slow observations would include grounded understandings of place in relation to time through immersion with its people and practices, spaces and stories. When tracing silencing actions, it is also important to be mindful of silence effects, while accounting for human beings' capacity to 'delete' contaminated geographies from their consciousness (Natali, 2017). Halsey's (2013) concept of 'dromospheric pollution' offers valuable insight in this regard, while Monod de Froideville (2022) 'narrative green victimology' and Louisson's (2021) 'spectrum of ignorance' are also instructive. Recognising the sovereignty of victims (Pemberton, 2016) when it becomes part of the problem of silencing pollution harm (and has the potential to affect future generations) will likely remain a challenge.

Pressure to address instances of pollution related harm, whether contemporary or historical, is building. There is a global effort underway to have ecocide included in the Rome Statute as a crime against peace. While campaigns tend to be focused on climate change (see for example, Stop Ecocide International, 2022), ecocide is historically tethered to the problem of pollution as it was first recognized in law in Vietnam following the devastation wrecked by AO. Furthermore, the United Nations (UN) Human Rights Council (2022) has articulated a toxic environment as a breach of the human right to a safe, clean healthy and sustainable environment in a report from its 49th session. Crucially, the report states that a rights-based approach requires states to address historical issues of pollution and emphasises a particular urgency on the clean-up of 'sacrifice zones', for injustices to be remedied and for victims to receive immediate and full reparation for harms suffered. It is notable that

the criteria for the label of a 'sacrifice zone' is almost identical to Davies' (2018) identification of'let die' policies in which the needs of residents in polluted communities are neglected or ignored. Davies (2022) argues that the silencing of harm in polluted communities helps to signify the irrelevance of the lives of the poor and marginalised (those who tend to populate polluted areas) to their respective leaders. Silencing, in this respect, breathes life into a politics of exclusion (Bauman, 2013; Goyes, 2019) that helps justify a mode of governance focused on the interests of profit makers (Bhandar, 2018).

Conclusion

We have traced the NZ government's silencing campaign to quash claims of adverse health effects associated with historical emissions from the production of 2,4,5-T at IWD's Paritutu plant. Our analysis has made two points clear. The first is that the people of Paritutu have been subjected to a lengthy operation to silence their experiences of harm from emissions containing excessive TCDD. The second is that silencing has been central in the development of historical pollution in Paritutu and the ensuing intensification of harm. Therefore, the silencing of lived experiences is indicative of the ontology of harm that stems from that pollution. With this being so, we urge the international community to call the NZ government's violations of human rights in this case to account and for it to provide appropriate recognition of and extenuation for suffering caused.

Funding Open Access funding enabled and organized by CAUL and its Member Institutions.

Data availability statement The documentary data sample supporting the findings of this study can be sourced from the corresponding author upon request.

Declarations

Both authors contributed to the study conception and design, and data collection and analysis. The first draft of the manuscript was written by Monod de Froideville. Both authors commented on previous versions of the manuscript. Both authors read and approved the final manuscript.
The authors did not receive financial support from any organization for the submitted work.
Gibbs declares an ongoing role as lead researcher/advocate for the Paritutu community in the fight for justice for harms related to historical emissions containing dioxin.

References

Agricultural Chemicals Board (ACB). (1970). *To Ivon Watkins-Dow* [Personal communication].

Agricultural Chemicals Board. (1972). *Report of the subcommittee on 2.4.5-T*. Wellington.
Monod de Froideville, S. (2022). Storied experiences of the Havelock North drinking water crisis: A case for a 'narrative green victimology'. *International Review of Victimology, 28*(2), 235–254.
Barton, A., & Davis, H. (Eds). (2018). Ignorance, Power and Harm: Agnotology and The Criminological Imagination. Springer International Publishing.
Baughman, R., & Meselson, M. (1973). An analytical method for detecting TCDD (dioxin): Levels of TCDD in samples from Vietnam. *Environmental Health Perspectives, 5*, 27–35.
Bauman, Z. (2013). *Wasted lives: Modernity and its outcasts*. Wiley.
Bhandar, B. (2018). Organised state abandonment: The meaning of Grenfell. *Sociological Review Blog*.
Bowen, G. A. (2009). Document analysis as a qualitative research method. *Qualitative Research Journal, 9*(2), 27–40.
Brinkman, G. L. (1986). *Possible health effects of manufacture of 2,4,5-T in New Plymouth. Report of the Ministerial Committee of Inquiry to advise on the impact on the health of the residents in New Plymouth from the manufacture of pesticides*.
Brisman, A. (2013). The violence of silence: Some reflections on access to information, public participation in decision-making, and access to justice in matters concerning the environment. *Crime, Law and Social Change, 59*(3), 291–303. https://doi.org/10.1007/s10611-013-9416-3
Butler, D. (2005). Connections: The early history of scientific and medical research on agent orange. *Journal of Law and Policy, 13*(2), 527–552.
Byrnes, G. (2001). *Boundary markers: Land surveying and the colonisation of New Zealand*. Bridget Williams Books.
Cabinet Policy Committee. (2004). *Release of Interim Report on serum dioxin study in New Plymouth*. New Zealand Cabinet.
Campbell, E. (2014). http://dioxinnz.blogspot.com/2014/03/lethallegacy.html. *Lethal Legacy*. http://dioxinnz.blogspot.com/2014/03/lethallegacy.html
Centonze, F., & Manacorda, S. (2017). *Historical pollution: Comparative legal responses to Environmental Crimes*. Springer.
Cohen, S. (2001). *States of denial: Knowing about atrocities and suffering*. Polity; Blackwell Publishers.
Collins, J. J., Wilken, M., McBride, D., Humphry, N. F., Herbison, P., Burns, C. J., & Bodner, K. (2009). Serum concentrations of chlorinated dibenzo-p-dioxins and dibenzofurans among former New Zealand trichlorophenol workers. *Chemosphere, 76*(11), 1550–1556. https://doi.org/10.1016/j.chemosphere.2009.05.037
Crichton, F. (2020). What are the roots of science denialism in the time of COVID-19, and how do we untangle them? *Science and Technology, University of Auckland*. https://www.thebigq.org/2020/12/16/what-are-the-roots-of-science-denialism-in-the-time-of-covid-19-and-how-do-we-untangle-them/
Crum, M. (2016). "Unhappily Ever after: How Women Became Seen and Not Heard in Our Favourite Fairy Tales." *Huffington Post*, https://testkitchen.huffingtonpost.com/grimm/
Davies, T. (2018). Toxic space and time: Slow violence, necropolitics, and petrochemical pollution. *Annals of the American Association of Geographers, 108*(6), 1537–1553. https://doi.org/10.1080/24694452.2018.1470924
Davies, T. (2022). Slow violence and toxic geographies: 'Out of sight' to whom? *Environment and Planning C: Politics and Space, 40*(2), 409–427. https://doi.org/10.1177/2399654419841063
Department of Health. (1977). *2,4,5-T and human birth defects*. Wellington.
Department of Health [DOH]. (1966). Hospital boards - Maternity services returns registered files, HMT17 - New Plymouth Health District, H1, 53/74/3/8, 32197, Archives New Zealand, Wellington, NZ.
Dotson, K. (2011). Tracking epistemic violence, tracking practices of silencing. *Hypatia, 26*(2), 236–257. https://doi.org/10.1111/j.1527-2001.2011.01177.x
Emson, R. (1999). Silence as evidence. In *Evidence* (pp. 223–243). Palgrave.
Exemption on abortion reported in Italy. (1976). *The New York Times*, 2.
Firestone, D., Ress, J., Brown, N. L., Barron, R. P., & Damico, J. N. (1972). Determination of polychlorodibenzo-p-dioxins and related compounds in commercial chlorophenols. *Journal of AOAC INTERNATIONAL, 55*(1), 85–92. https://doi.org/10.1093/jaoac/55.1.85
Fisher, D., & Bartle, R. (2006). Those sun-drenched dioxin days. *The New Zealand Herald*.
Fjelland, R. (2021). When laypeople are right and experts are wrong: Lessons from Love Canal. In J. Schummer & T. Børsen, *Ethics of Chemistry* (pp. 195–219). World Scientific. https://doi.org/10.1142/9789811233548_0008

Foster, J. B. (1999). Marx's theory of metabolic rift: Classical foundations for environmental sociology. *American Journal of Sociology, 105*(2), 366–405.

Fowles, J., Baker, V., Phillips, D., Marriot, F., Stevenson, C., & Noonan, M. (2004b). *A study of 2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD) exposures in Paritutu, New Zealand* [Interim report 2]. Institute of Environmental Science and Research Ltd.

Fowles, J., Baker, V., Phillips, D., Marriot, F., Stevenson, C., & Noonan, M. (2004a). *A study of 2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD) exposures in Paritutu, New Zealand* [Interim report 1]. Institute of Environmental Science and Research Ltd.

Fowles, J., Gallagher, L., Baker, V., Phillips, D., Marriott, F., Stevenson, C., & Noonan, M. (2005). *A study of 2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD) exposures in Paritutu, New Zealand*. Institute of Environmental Science and Research Ltd for the Ministry of Health.

Fowles, J., Noonan, M., Stevenson, C., Baker, V., Gallagher, L., Read, D., & Phillips, D. (2009). 2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD) plasma concentrations in residents of Paritutu, New Zealand: Evidence of historical exposure. *Chemosphere, 75*(9), 1259–1265. https://doi.org/10.1016/j.chemosphere.2009.01.067

Galván-Álvarez, E. (2010). Epistemic violence and retaliation: The issue of knowledges in "Mother India" / Violencia y venganza epistemológica: La cuestión de las formas de conocimiento en Mother India. *Atlantis, 32*(2), 11–26.

Gaspari, L., Paris, F., Kalfa, N., Soyer-Gobillard, M.-O., Sultan, C., & Hamamah, S. (2021). Experimental evidence of 2,3,7,8-Tetrachlordibenzo-p-Dioxin (TCDD) transgenerational effects on reproductive health. *International Journal of Molecular Sciences, 22*(16), 9091. https://doi.org/10.3390/ijms22169091

Global Witness. (2022). *In Numbers: Lethal attacks against defenders since 2012*. Challenging Abuses of Power to Protect Human Rights and Secure the Future of Our Planet.

Goyes, D. R. (2019). *Southern green criminology: A science to end ecological discrimination*. Emerald Group Publishing.

Goyes, D. R., & Sollund, R. (2018). Animal abuse, biotechnology and species justice. *Theoretical Criminology, 22*(3), 363–383.

Hager, N., & Burton, B. (1999). *Secrets and lies*. Common Courage Press.

Hall, S. (1975). Introduction. In A. Charles, H. Smith, E. Immirizi, & T. Blackwell (Eds.), *Paper voices: The popular press and social change, 1935–1965* (pp. 9–24). Chatto and Windus.

Halsey, M. (2013). Conservation criminology and the "General Accident" of climate change. *The Routledge International Handbook of Green Criminology.* Routledge.

Harvey, H. (2020). The power of a name: Indigenous meaning or old country memories? *Stuff*. https://www.stuff.co.nz/pou-tiaki/te-reo-maori/122721244/the-power-of-a-name--indigenous-meaning-or-old-country-memories

Heblich, S., Trew, A., & Zylberberg, Y. (2021). East-side story: Historical pollution and persistent neighborhood sorting. *Journal of Political Economy, 129*(5), 1508–1552.

Hendy, S. (2016). *Silencing science* (vol. 43). Bridget Williams Books.

Herzog, B. (2018). Invisibilization and silencing as an ethical and sociological challenge. *Social Epistemology, 32*(1), 13–23. https://doi.org/10.1080/02691728.2017.1383529

Human Rights Council (2022). The right to a clean, healthy and sustainable environment: non-toxic environment. Report of the Special Rapporteur on the issue of human rights obligations relating to the enjoyment of a safe, clean, healthy and sustainable environment. United Nations.https://documentsddsny.un.org/doc/UNDOC/GEN/N22/442/77/PDF/N2244277.pdf?OpenElement

Humphreys, L. (2001). Health report finds no link to dioxin. *The Daily News*.

International Agency for Research on Cancer (IARC). (1977a). *Some fumigants, the herbicides 2,4-D and 2,4,5-T, chlorinated dibenzodioxins and miscellaneous industrial chemicals*. IARC.

International Agency for Research on Cancer (IARC). (1997b). *Polychlorinated dibenzo-para-dioxins and polychlorinated Dibenzofurans*. IARC.

Ivon Watkins-Dow, I. (1975). Poisons, defoiliants, naplam. *Salient, 38*(25).

Jordan, J. (2012). Silencing rape, silencing women. In J. M. Brown & S. Walklate (Eds.), *Handbook on sexual violence* (pp. 253–286).

Jordan, J. (2022). *Women, rape and justice: Unravelling the rape conundrum* (1st ed.). Routledge. https://doi.org/10.4324/9780429455773

Joy, M. (2021). It's a hard road taking on the critic and conscience role as an academic. *Freshwater for life*. https://waterqualitynz.info/2021/09/03/my-presentation-to-the-teu-academic-freedom-critic-and-conscience-conference-31-aug-2021/

Kauth, J. M. (2020). Rhetoric of Denial. Framing the apocalypse in mainstream, denialist, and social media. In E. G. Dobbins, M. L. Piga, & L. Manca (Eds.), *Environment, social justice, and the media in the age of the Anthropocene* (pp. 243–256). Lexington Books.

Kellermann, A. L., & Rivara, F. P. (2013). Silencing the science on gun research. *JAMA, 309*(6), 549. https://doi.org/10.1001/jama.2012.208207

Kidman, J. (2017). Pedagogies of forgetting colonial encounters and nationhood at New Zealand's national museum. In T. Epstein & C. L. Peck (Eds.), *Teaching and learning difficult histories in international contexts: A critical sociocultural approach* (pp. 95–108). Routledge/Taylor & Francis Group.

Landman, A., & Glantz, S. A. (2009). Tobacco industry efforts to undermine policy-relevant research. *American Journal of Public Health, 99*(1), 45–58. https://doi.org/10.2105/AJPH.2007.130740

Louisson, C. (2021). *Seeping ugly*. Masters' Thesis. Te Herenga Waka - Victoria University of Wellington: Wellington, New Zealand.

Loveless, W. G. (1969). *To F. B. Thompson on the restrictions on 2,4,5-T* (PB13/1 Vol 1). Agricultural Chemicals and Veterinary Medicines group of the New Zealand Food Safety Authority.

Loveless, W. G. (1970). *To F. B. Thompson in response to request for information on technical aspects of 2,4,5-T testing* (PB13/11 Vol 1). Agricultural Chemicals and Veterinary Medicines group of the New Zealand Food Safety Authority.

Mann, R. (1972). 2,4,5-T - Just a weed killer? *Salient, 35*(4), 6–7.

Mathiesen, T. (2008). *Silently Silenced: Essays on the Creation of Acquiescence in Modern Society*. Waterside Press.

McGoey, L. (2012). The logic of strategic ignorance. *The British Journal of Sociology, 63*(3), 533–576.

McHenry, L. B. (2018). The Monsanto papers: Poisoning the scientific well. *International Journal of Risk & Safety in Medicine, 29*(3–4), 193–205. https://doi.org/10.3233/JRS-180028

McQueen, E. G. (1980a). *Direct testimony of Dr. E. G. McQueen*. Released under the Official Information Act.

Natali, L. (2017). The contribution of green criminology to the analysis of historical pollution. In F. Centonze & Stefano Manacorda (Eds.), *Historical pollution: Comparative legal responses to environmental crimes* (pp. 21–55). Springer.

Nelson, C. L. (1990). *Long time passing*. New Zealand memories of the Vietnam war. National Radio.

Ninnes, T. (2004). Science, public participation and spin. In K. Dew & R. Fitzgerald (Eds.), *Challenging science: Issues for New Zealand society in the 21st century* (pp. 68–87). Dunmore Press Ltd.

O'Connor, P. (2001). *Rates of reported illness in Paritutu and Moturoa. A report to the Taranaki District Health Board*. New Plymouth

O'Connor, P. (2002). *Neural tube defects at Westown Maternity Hospital, 1965–72. A report to the Taranaki District Health Board*. New Plymouth

Pemberton, A. (2016). Environmental victims and criminal justice: Proceed with caution. In T. Spapens, R. White, & M. Kluin (Eds.), *Environmental crime and its victims: Perspectives within Green Criminology* (pp. 63–86). Routledge.

Pilgrim, R. (1986). *Submission to the Committee of Inquiry into possible health effects of the manufacture of agricultural chemicals in New Plymouth* (156/36/1). ABQU 632.

Rotolo, G. (2017). Historical pollution: in search of a legal definition. In F. Centonze & Stefano Manacorda (Eds.), *Historical pollution: Comparative legal responses to environmental crimes* (pp. 57–89). Springer.

Sare, W. M., & Forbes, P. I. (1972). Possible dysmorphogenic effects of an agricultural chemical: 2,4,5-T. *The New Zealand Medical Journal, 75*, 37–38.

Scott, D. N. (2016). 'We Are the Monitors Now': Experiential knowledge, transcorporeality and environmental justice. *Social & Legal Studies, 25*(3), 261–287. https://doi.org/10.1177/0964663915601166

Sills, P. (2014). *Toxic war: the story of agent orange*. Vanderbilt University Press.

Skinner, S. (2021). *Manitoba becomes fourth province in canada to pass ag-gag laws*. Sentient Media. https://sentientmedia.org/manitoba-becomes-fourth-province-in-canada-to-pass-ag-gag-laws/

Skinnider, E. (2011). *Victims of environmental crime: Mapping the issues*. International Centre for Criminal Law Reform and Criminal Justice Policy.

Smith, A. H., Patterson, D. G., Warner, M. L., Mackenzie, R., & Needham, L. L. (1992). Serum 2,3,7,8-Tetrachloro-dibenzo-p-dioxin levels of New Zealand pesticide applicators and their implication for cancer hypotheses. *JNCI Journal of the National Cancer Institute, 84*(2), 104–108. https://doi.org/10.1093/jnci/84.2.104

Sollund, R. (2013). Crimes against animal life. *Encyclopedia of criminology and criminal justice,* 759–769.

Sollund, R. (2017). Causes for speciesism: Difference, distance and denial. In R. White (Ed.), *Transnational Environmental Crime* (pp. 75–96). Routledge.

Stanley, E., & Day, S. (2021). Ignoring state-corporate crimes: The case of the Pike River mine disaster. In E. Stanley, T. Bradley, & Author 1 (Eds.), *Aotearoa handbook of criminology* (pp. 131–142). Auckland University Press.

Stauber, J. (1999). *Foreword* (pp. 8–10). Common Courage Press.

Sterling, T. D. (1972). *Problems in determining if a commonly used herbicide (2, 4, 5-t) has an effect on human health*. Sixth Berkeley Symposium on Mathematical Statistics and Probability, University of California, Berkeley.

Stop Ecocide International. (2022). *Stop Ecocide International.* https://www.stopecocide.earth/

Taslitz, A. E. (1999). *Rape and the culture of the courtroom* (vol. 6). NYU Press.

Thompson, F. B. (1970). *To W. Gordon Loveless on restrictions on use of 2,4,5-T* (PB13/1 Vol 1). Agricultural Chemicals and Veterinary Medicines group of the New Zealand Food Safety Authority.

Trundle, C. (2020). Translating proof: Contested illness, radiation exposure, and the health claims of nuclear test veterans. In M. de Leeuw & S. van Wichelen (Eds.), *Personhood in the age of biolegality* (pp. 75–90). Springer International Publishing. https://doi.org/10.1007/978-3-030-27848-9_5

Ureta, S., Flores, P., & Soneryd, L. (2020). Victimization devices: Exploring challenges facing litigation-based transnational environmental justice. *Social & Legal Studies, 29*(2), 161–182. https://doi.org/10.1177/0964663919841121

Vallée, M. (2021). Fostering ignorance to maintain public support: New Zealand's 2002–2004 urban aerial pesticide spraying operation over Auckland. *Environmental Sociology, 7*(4), 382–392. https://doi.org/10.1080/23251042.2021.1884341

Wildblood-Crawford, B. (2008). *Environmental (In) justice and 'expert knowledge': The discursive construction of dioxins, 2, 4, 5-T and human health in New Zealand, 1940 to 2007.* PhD thesis: University of Canterbury, Christchurch, New Zealand.

Wilson, N., & Horrocks, J. (2008). Lessons from the removal of lead from gasoline for controlling other environmental pollutants: A case study from New Zealand. *Environmental Health, 7*(1), 1. https://doi.org/10.1186/1476-069X-7-1