Toxic Disputes and the Rise of Environmental Justice in Australia

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The paper examines the rise of environmental justice issues in Australia, evident in two toxic disputes; the first, in a Perth outer suburb in Western Australia where residents faced both a hazardous waste dump and the nation's biggest chemical fire; and the second, in the Sydney suburb of Botany where residents were confronted with the destruction of what is thought to be, the world's largest stockpile of hazardous hexachlorobenzene (HCB) waste. The paper reviews the range of factors that impacted the local communities' fight for environmental justice. It explores the limitations of risk assessment and risk-based policies, as well as the problematic role of the expert and the communication of risk. The informational inequity and resource disparities so evident in toxic disputes are highlighted. The case studies confirmed the inequitable distribution of chemical risk as a failure to secure environmental justice for all Australians. *Key words*: human rights; environmental justice; Australia.

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> Australia has in recent years witnessed the rise of a broad based movement which is class (and community) orientated, . . . increasingly politicised yet decentralised and independent . . . based on the simple idea that people have a right to decide what happens to their communities.
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> FRIENDS OF THE EARTH, November 1999[1]

In 2001, the United Nations Commission on Human Rights confirmed that it is a basic human right to live in a world free from toxic pollution and environmental degradation. The recognition of this is evident in the rise of community campaigns in Australia. The recent release of "Local Heroes, Stories from the Environmental Frontline,"[2] gives voice to a rising tide of community activism, evident in the campaigns against urban lead contamination, industrial smelters in regional communities, and the impacts of pesticides, contaminated land, and hazardous waste.

This paper focuses on two such communities; the first in an outer suburb of Perth in Western Australia where residents faced both a hazardous waste dump and the nation's biggest chemical fire; and the second in the Sydney suburb of Botany, where residents were confronted with the destruction of what is thought to be the world's largest stockpile of hazardous hexachlorobenzene (HCB) waste.[a] Both of these campaigns demonstrated the informational inequities and resource disparities so evident in toxic disputes. They also revealed a range of legal, technical, and regulatory factors that impact a community's fight for environmental justice. The campaigns highlighted the limitations of risk assessment and risk-based policy as well as the problematic role of the expert and the communication of risk. Most importantly, they point to the many assumptions of risk assessment, its corrosive impact upon procedural justice, and the consequent distributive "environmental injustice."

ENVIRONMENTAL JUSTICE IN AUSTRALIA

The term "environmental justice" refers to the distribution and impacts of environmental problems as well as the policy responses to address them. Environmental justice focuses on the right to a safe, healthy, productive, and sustainable environment for all, where "environment" is considered in its totality. Environmental injustice focuses on the inequitable distribution of those who bear the risks. Nevertheless, the problem of environmental injustice cannot be resolved by addressing distributive equality alone. In Australia, other elements such as the institutional context and the role of power in decision making, access to information, and the control by experts of the risk-analysis process are all essential aspects of addressing environmental injustice.

While the United States has specific legislative requirements to protect the interests of environmental justice communities of concern (EJCOC),[b] the Aus-

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[a]Hexachlorobenzene or HCB is listed as one of the dirty dozen under *the Stockholm Convention on Persistent Organic Pollutants (2001),* which Australia signed in May 2001.

[b]*U.S. Executive Order (EO) 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations* outlines the legal requirements to protect the interests of an Environmental Justice Community of Concern (EJCOC). An EJCOC is any aggregated or dispersed population that (a) is a low-income population based on the Bureau of the Census (BOC) Current Population reports, (b) is over 50% minority, or (c) contains a minority population percentage meaningfully greater than the minority population percentage in the general population or other appropriate unit of geographic analysis.

tralian regulatory climate has yet to acknowledge environmental justice, let alone adopt the concept of environmental justice communities of concern.

Environmental justice grew out of the second wave of modern environmentalism. While "first-stage" environmental disputes were typically over access to natural environmental resources such water, forests, minerals, and oil reserves,[3] a second stage of modern environmentalism saw the movement towards environmental justice issues, most evident in the conflicts over environmental planning decisions. As an increasing number of industrial developments encountered community opposition,[4] many planning or siting disputes were dismissed as "NIMBY" or "not in my back yard" phenomena. Some commentators[3] argued that these disputes were based on self-interests, that is, citizens who were willing to enjoy the benefits of an industrialized society but not willing to bear the costs. Yet, this simplistic view ignores the economic and social factors as well as the disparities in power and resources, and of course, the blatant inequality in risk and benefit distribution.

In contrast, Reich[5] views these "toxic disputes" as the legitimate political process of redress for victims of chemical contamination or residents adversely affected by the siting of hazardous facilities. He identified three stages common to toxic disputes:

- Non-issue or private trouble
- Public issue or victims' struggle
- Political issue/ society's conflict.[5]

This model of phased conflict, seen at each stage of the transformation of the dispute from private to public to political, brings with it additional costs and burdens for the participants, but also new opportunities for alliances and capacity building that could help move the dispute to a final equitable and just resolution. Inevitably, the dynamic, complex and multidisciplinary nature of toxic disputes brings with it significant challenges for the communities involved. To negotiate a resolution to their problem, be it hazardous waste management or ongoing pesticide use, they must develop and use knowledge of dispute resolution, national and international environmental law, information technology, scientific and technical communication, and risk assessment, as well as the disciplines of waste management and chemistry.

The institutional response to toxic disputes is often based on a widely held assumption that the community's mistrust of technology is due simply to its ignorance and misunderstanding of science. Yet, the United Kingdom House of Lord's Report (2000) clearly dismissed this.[6] They stressed that democratic citizenship in a modern society depends on the ability of citizens to examine and criticize scientific claims. However, ready access to the scientific and technical information in toxic disputes is heavily influenced by commercial and legislative restrictions and the inherent inequities in the expertise available to the various parties.

In the two cases presented, the communities were low-income populations with a high degree of minority groupings. In the industrial residential suburb of Botany in Sydney, more than 45% of local residents have been born overseas, with most having English as a second language. The Perth suburb of Bellevue is a small mixed residential and light-industrial suburb that shares a similar demographic, with low housing prices, low incomes, and poor educational status. A relatively high proportion of elderly East European immigrants and blue-collar workers populate the suburb.

CASE STUDIES

Bellevue, Western Australia—Phase 1. The Omex Toxic Dump

Bellevue (Fr. "beautiful view") has been subject to two overlapping toxic disputes that reached a climax in 2001, with a chemical explosion and fire at the Waste Control Pty. Ltd. hazardous facility. For half a century Bellevue had suffered the contamination of the Omex toxic dump, a large leaking pit filled with acid sludge from a disused oil re-refinery. While the long-running Omex saga preceded the Waste Control Pty Ltd incident, they shared many common features, the most salient being the failure of decision makers to learn from the mistakes of the past.

The mining of clay for the brickworks[c] in the Bellevue area left the landscape dotted with open clay pits that rapidly filled with groundwater due to the low-lying nature of the suburb and its proximity to the Helena River.[7] One of these clay pits later became the Omex toxic dump.

The building boom that followed World War II saw the neighboring towns of Midland and Bellevue rapidly overwhelm the surrounding bushland,[8] with an influx of European immigrants settling in the area. By the mid 1950s, it was a solid blue-collar community, with many workers employed by the railways, the abattoirs, and the brickworks, including a sizeable component of newly arrived migrants.

In 1954,[9] an oil re-refinery relocated to Bellevue and the struggle of Bellevue residents against its environmental impacts began. Importantly, the siting of the refinery had been determined by local government in consultation with a private town planner, and residents were not consulted. The Western Oil Refinery (later renamed Omex) was licensed to operate under the proviso that it would not dump contaminated waste in the

[c]The Midland Brick Pty Ltd. site is the world's largest and is the subject of ongoing community complaints about health impacts from hydrogen fluoride (acid gas) emissions. Metro Brick and Whiteman's Brick also impact on Bellevue's airshed and are subject to ongoing complaints and community campaigns.

clayhole on its property.[10] The oil company did not comply with the regulation, and dumping of wastes into the pit began with the commencement of refining.[9]

From then on decades of complaints and litigation dogged the refinery. Residents were continually subjected to nauseating fumes that were "associated with a blue haze" over the suburb.[11] In 1977, the Swan Shire Chief Health Officer concluded that "he could smell strong chemical odours, causing a burning sensation in the respiratory tract" within a one-mile radius of the site.[12] For three decades petitions were raised, protests held, and politicians lobbied. Behind the scenes State government agencies grappled with the economic and social issues raised by the refinery. In 1978, a senior health official urged the Department of Conservation and Environment to relocate the refinery to a heavy industrial area, acknowledging the "environmental disadvantage" suffered by Bellevue residents from the ongoing odour emissions from the open clay storage pit.[13] The official noted the *dilemma* of maintaining a good supply of cheap oil for the Western Australian Government while protecting residents' rights. The pollution of Bellevue was viewed as a tradeoff for the supply of cheap recycled oil for the economic benefit of the State. In the correspondence of the time, lawyers for the oil company argued the case that the suffering of the few was for the benefit of the greater good.[14]

Several blazes at the Omex site in the 1960s and 1970s saw huge mushroom clouds of dense black toxic smoke rise over the suburb, depositing ash and residues on surrounding properties. From the limited testing conducted it was found that the houses closest to the pit had elevated levels of lead and some species of polyaromatic hydrocarbons in their soil. By now, the sludge in the pit was extremely acidic and was contaminated with high levels of sulfurous compounds, heavy metals, polyaromatic hydrocarbons,[15] and dioxin.[16]

Faced with mounting pressure from residents and litigation by local government, the Western Oil Refinery eventually ceased refining in 1979, changed its name to Omex, and shifted to the less noxious practice of oil blending. However, anecdotal reports suggested that dumping of waste oils into the pit continued as late as 1985. With the closure of the refinery, localized air pollution and community agitation declined. Yet, the deep pit of toxic ooze, the size of a soccer pitch, remained. Sporadic complaints about the fumes from the sand-covered pit continued throughout the 1980s, but the issue was largely forgotten by authorities. Meanwhile, many new residents moved into the suburb unaware of the contamination issue.

In 1995, newly arrived residents living close to the site discovered chemical contamination in the groundwater surfacing in their back yards. A new campaign developed to clean up the toxic pit and to relocate the worst-affected residents living on or adjacent to the contamination. Residents formed the Bellevue Action Group (BAG) and pressed the conservative State government for funds to remediate the site and to relocate some residents. Following three years of intense campaigning, the action group prevailed and $6.9 million was allocated to clean up the site. Three residential households were also eventually relocated.[17]

In April 2000, clean-up of the toxic pit began. The "dig-and-dump" operation required the excavation of the acidic toxic sludge, which was trucked to a landfill site 15 kilometers away. Significant risks were involved in the clean-up, and BAG warned the government to isolate the excavations from the environment due to the highly toxic gases that would be emitted. Research by the BAG disclosed an almost identical remediation in the United States, where fugitive chemical emissions had affected the health of local residents during the operation. The McColl Superfund site remediation included a sealed dome to prevent the escape of fugitive toxic vapors.[18] The BAG warnings were ignored, and instead the government agencies installed air-monitoring devices to "assure" the community that they were not in any danger. The monitors were poorly deployed and suffered "calibration errors" in over a third of the 300,000 data points logged.[19] Depending on who was asked, action levels[d] were exceeded 169 times (according to THIESS remediation contractors)[20] or 267 times (Bellevue Action Group)[19] or even 362 times (health authorities).[21] Yet little was done to stop the flood of fugitive emissions from the site. Instead, chemical deodorant sprays were employed on the site boundaries to neutralize the ability of people to smell the fumes. One spray device was even placed in the primary school corridor until teachers complained of feeling ill from the deodorant fumes! Installing deodorant sprayers removed one of the few natural defenses residents still had available to them to detect and remove themselves from concentrated pockets of emissions.

Attempts to "manage" the fumes from the site failed, and many residents reported to the DEP that the fumes were making them ill[21]; others broke out in rashes over their entire bodies, and some were hospitalized. For over two months the acrid fumes that had blanketed Bellevue in the 1960s and 1970s returned. Activists blockaded the remediation site and demanded that the remediation be made safe. Government agencies promised to improve the situation and the blockade was lifted. Unfortunately, the problems persisted and resulted in a dozen Bellevue residents' commencing litigation against the Western Australian Government seeking reparation for injuries suffered from exposure

[d]Alert levels and action levels were set for particular contaminants such as SO_2, lead, PM10 and benzene. If according to monitoring instruments, the action levels were exceeded, excavation was to stop immediately. Action levels were exceeded regularly, often at night when no personnel were present to 'take action' to reduce emissions.

to the fumes generated in the clean-up. The Omex pit was eventually backfilled with clay and currently awaits redevelopment as a residential subdivision. Omex Petroleum continues to blend oils on the adjoining property and government estimations suggest groundwater in the area will remain contaminated for the next 100 years.[22]

One of the most contentious issues during the campaign involved the assessment and communication of risk, particularly as it related to human health. Risk assessment was employed by the Departments of Health (DoH) and Environmental Protection (DEP) to assure the public that the soil contamination around the site was harmless, that dioxin levels were negligible, and that air monitoring showed no risk to public health before or after the remediation. The DoH claimed that any ill health was caused not by the emissions but by "a mass psychological overlay" generated by negative media coverage of the events.[e] They later attempted to climb down from this precarious position, suggesting "that anxiety could be one of the reasons for some of the symptoms reported by individuals in the Bellevue area."[23]

Any constructive dialogue was restricted by the pronouncements of complete safety by government "experts." As the community became more competent at critiquing the uncertainty of risk sciences, government agencies were unwilling to discuss this or accept any view other than that generated by their risk assessment. Yet, locals made their own judgments about the risks of the remediation based on their personal experience, and many left town for the duration of the clean-up. However, others, who were too poor or too old to escape the fumes, tried to seal themselves in their houses during the stifling summer heat, which often exceeded 105° F in the shade.

Despite the many negative impacts of the Omex site and its remediation, some positive features emerged. The broader community demanded a right to know about contaminated sites, and maps are now available to the Western Australian public on the Internet.[24] Many Bellevue residents became educated about the risks of toxic wastes and were far more critical of assurances based on risk assessment. Local activism and resistance to authority displaced a traditional apathy in the community, whose members were now more confident of their capacity to engage decision makers. This capacity building took over five years and left the community better prepared to deal with other toxic disputes; and it wasn't long before these new skills would be pressed into action.

[e]Interview Jane Bremmer and Peter Vintilla, BAG (June 2000. Perth) Ms. Bremmer's diary notes conclude the statement was by Dr. Paul Psaila Savona, Executive Director of Public Health, in blockade negotiations at the Omex site between BAG and the DEP and DoH on May 11, 2000.

Bellevue, Western Australia—Phase 2. The Waste Control Disaster

> There can be no doubt that the Waste Control site at no time fully complied with its licence requirements and rarely, if ever, operated profitably. The situation that developed at Waste Control is evidence of the failure of waste management operators and governments to clearly understand the economic, social and environmental values and risks associated with the industry.
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> —TONY MCRAE, MLA. Chairperson,
> Bellevue Hazardous Waste Fire Inquiry, June 2002[25]

In another part of Bellevue, in a small cul de sac of mixed residential and light industrial buildings, the Waste Control Pty Ltd Company occupied a converted weatherboard house on a 0.25-ha site where they carried out the business of "solvent recycling." A hundred meters to the southwest lay a dampland to which the streets drained and which discharged to the Helena River. Forty years ago this section of Bellevue had been entirely residential, but with industry encroachment, many residents had moved on, and now numerous small automotive yards, industrial sheds, and converted weatherboard houses were used for a variety of trades and commercial purposes. Still, some residential homes remained, and with the high commercial occupancy rate, the area was generally busy during working hours.

The Waste Control Company had operated on this site in various forms since 1989 and its activities had been known to the DOH and the DEP since their inception. Indeed, both government agencies recommended the facility to industries as a means of disposing of their hazardous waste.[26] The DOH held carriage of matters involving waste management in Western Australia until 1994[27] and was partially responsible for regulating activities at the site until that time. From 1994 onwards, the DEP handled waste regulation, while the Department of Minerals and Energy licensed dangerous-goods storage for flammables and explosives. All three agencies had direct roles in the oversight and regulation of the facility for the 13 years it was in operation. Waste Control employed between two and seven staff members[f] to process a variety of hazardous wastes, yet only two staff members had received technical training in chemicals management. Few Bellevue residents knew that facility existed, and even fewer were aware of the nature of the operation.

The front of the site appeared innocent enough, with a weatherboard house as an office and a small hut adjacent used as a laboratory. Behind these structures the scene was far more alarming. Up to 3,000 205-liter drums of chlorinated and halogenated solvents, thinners, acids, oils, and unknown wastes were stacked four

[f]Interview with former Waste Control yard workers (23 February, 2001, Perth).

high and dozens deep. Banks of industrial nickel–cadmium batteries were stacked among the drums. Heavy-metal compounds, including numerous glass Winchester bottles of mercury, were piled around the yard. A pot distillery unit operating with superheated oil from an "oil burner"[g] was at the center of the open storage yard and was used to separate contaminants from used solvents. The treated solvents were then resold to local users. The sludge waste from the distilling unit[h] was stored in drums on-site. Waste Control Pty. Ltd. had no capacity to treat heavy metals and many other wastes that made their way to the site. Underground storage tanks also held thousands of liters of liquid solvent waste.[i] In all, it is estimated that between 500,000 and 1 million liters of hazardous waste were stored on the site.[j]

Spills of hazardous liquids were a common occurrence at the site. Drums leaked and workers were often forced to operate in atrocious conditions. One worker collapsed from fumes only to be told by more senior staff that "you'll get used to it," whereupon he was carried to the front yard for fresh air.[k] At other times workers were forced to trudge around in inches of spilled perchloroethylene waste and were asked to mix unknown chemicals and acids, with perilous results. Eye injuries were occurring weekly before the introduction of monogoggles.[26] On a number of occasions in the late 1990s hazardous liquids overflowed from onsite sumps, spilling out of the site and down the road. Local residents and businesses started complaining about the chemical odors and spills but no action was taken by any of the government departments. A particularly bad spill in 1999[27] led to a $100,000 loan to the company from the West Australian Government to clear out the backlog of 1,000 drums and send them to a disposal site in the eastern states. The loan was never recovered. Within months the space that had been created by removing 1,000 drums was again filled with new drums of waste and the situation at the site became even more precarious. Reactive chemicals were piled high upon each other and workers feared a fire or explosion at any moment. By January 2001 most workers had quit the site, leaving only the manager, his assistant, and a truck driver.[l]

At around 10.45 PM on February 15, 2001, residents of Bellevue were awakened by a series of massive explosions that shook windows and lit up the night sky. Few people had any idea of the source of the explosions or the danger that beset them. Before sunrise, television viewers in the east of Australia, the United States, and even Germany[m] had more information about the Waste Control chemical fire than most Bellevue residents did. Professional firefighters racing to the scene understood they were to attend a "factory fire" and were ill equipped for the environment they were about to enter. Volunteer firefighters with virtually no personal protective equipment were also called into action to attend "scrub fires" at the same location.

For reasons that remain officially unknown, the Waste Control facility had erupted into flames, and within minutes massive explosions rocked the area. Infrared footage taken by DEP officers on the way to the scene shows huge white fireballs erupting from the facility and 205-liter drums flying hundreds of meters into the air, and landing on neighboring properties and the highway. An enormous black plume of smoke could be seen by the light of explosions as it drifted west towards the center of the capital city, Perth. Later, air modeling demonstrated that the majority of the toxic particulate in the smoke cloud had been deposited in the Swan River near the center of the city.[28]

Firefighters mistakenly struggled to contain the blaze with water and failed. Eventually the chemicals were left to burn out of their own accord. Foam was not used, as the firefighters had been told it was a "factory" fire, not a "chemical" fire. Millions of liters of firefighting water washed a cocktail of chemicals and heavy metals from the site onto adjacent properties and down road drains. The contaminated water exited the drains in the damplands near the Helena River and behind the Bellevue Primary School within meters of the nearest classroom. The fire was finally contained around 3 AM Friday morning, but erupted again later that morning as drums continued to explode while emergency personnel attempted to access the burnt-out site. By midday the fire was extinguished.

A heavy stench of chemical fumes hung over the suburb for days as government agencies struggled to come to grips with the extent of the contamination. Health authorities admitted that the evacuation on the night of the fire was a failure[29] and that unprotected firefighters had been engulfed by the toxic smoke and vapors as they fought nearby scrub fires started by

[g]The exact nature of this apparatus has never been determined and it was destroyed in the fire. However, a 1995 audit by a corporate waste supplier identified 'alcohols' as the fuel for the burner.[26]

[h]Commonly referred to in the waste industry as 'pot stills'.

[i]Perchloroethylene, a chlorinated solvent used in drycleaning processes, was most common, with thousands of liters stored above and below ground. While not flammable, 'perc,' as it is commonly known, decomposes to deadly phosgene gas when incinerated.

[j]Government officials estimate 500, 000 liters were on site while former workers estimate that up 1 million liters were stored.

[k]Interview with former Waste Control yard workers (23 February, 2001, Perth). Workers indicated this was not an uncommon occurrence.

[l]Interview with former Waste Control yard workers (23 February, 2001, Perth). A heated altercation between yard workers and management over the handling of an aluminum flask marked "strontium" led to the walkout by workers.

[m]Footage of the fire was so spectacular that it was being syndicated through television networks in other countries before most Western Australians had awaken the next morning. Surveys of Bellevue residents later found that many locals slept through the fire. Authorities even had a clear idea of the severity of the issue. A local environmental group, The Alliance for a Clean Environment, received calls from associates in the United States and Germany indicating that they were viewing footage of the fire before it had even been extinguished.

falling drums. Some were admitted to hospitals[30] and later developed severe health problems. Of 110 emergency personnel who attended the fire, 15 were found to have unusually high levels of chemicals in their systems when tested.[30]

Still the residents in proximity to the fire were given no information, and official reports to the media claimed only thinners and white spirit had burned in the fire. The school bus depot was situated only 50 meters from the fire and was blanketed in toxic residue and condensate. Yet, later that Friday morning, 700 local schoolchildren were picked up in buses dripping with "yellow" residues of the fire. The buses were pulled off the road within hours and then allowed to continue after receiving the OK from the Health Department toxicologist.[n] Many children complained they felt ill after traveling in the buses. Tests conducted on the buses later in the week[31] found elevated levels of organic contaminants as well as lead, mercury, and numerous other hazardous compounds. The DOH toxicology section advised the DEP that, on the basis of their risk assessment; "Analytical results from these samples indicated levels of heavy metals which may pose a risk to children should they lick the surfaces daily for a week."[32]

Environmental sampling commenced within a week of the fire and detected heavy metals, phthalates, phenols, and chlorinated solvents at high levels on-site and in the drains where the contaminated firewater had flowed.[31] Dioxin was also detected up to 200 meters from the site. Subsequent groundwater analysis revealed high levels of chlorinated solvents[33] in groundwater moving beneath the Waste Control site. More recently, groundwater monitoring[34] has demonstrated that contamination (including high mercury levels)[35] has moved through the dampland and now sits only a few meters from the banks of the Helena River. No remediation plan has yet been devised for the site or to prevent the spread of contamination in groundwater.

Community activists lobbied hard for an inquiry and called for a health surveillance program for residents or other personnel who were affected by fumes or other impacts from the fire. On 21 May, 2001, over three months after the fire, the Parliamentary inquiry finally began, focusing on the "fact" that residents were fortunate that mercury had not been burned in the fire, despite the detection of elevated levels of mercury around[36] and beneath[35] the site, as well as in the ambient air.[36] Similarly, the inquiry refused to acknowledge the presence of PCBs on-site. This was despite their being detected in follow-up Greenpeace soil sampling, photographic evidence of transformers on the site,[o] and company invoices showing that hundreds of liters of oil containing PCBs had passed through the site. Importantly, many of the Inquiry's risk judgments were based on the "fact" that mercury and PCB were not present!

A community consultative committee was finally established 18 months after the fire. Yet, key questions remain unanswered: Why did the planning regime permit such a hazardous facility to be sited in a residential area? Why was Waste Control's license not revoked when it was apparent they were incapable of safely running the operation? Why was air monitoring not conducted for weeks following the fire? Why was no attempt made by health officials to contact Bellevue residents in the aftermath of the fire? Why did government officials claim there was "no risk" on the basis of risk assessment despite obvious and serious contamination?

POPs Stockpile in Botany NSW

The second community campaign example focuses on the concerns of local residents over the destruction of the stockpile of persistent organic pollutant (POPs) in their Sydney suburb of Botany. While Australia had withdrawn the registration of hexachlorobenzene (HCB) as a fungicide in the 1970s,[p] from 1964 to 1991, the chemical company Orica Australia Pty. Ltd. (formerly ICI Australia) produced HCB as an unwanted byproduct from its manufacture of chlorinated solvents; carbon tetrachloride and perchlorethylene. Approximately, 10,5000 tonnes of HCB-contaminated waste is stored at the Botany Industrial Park awaiting destruction.

In 1992, Australian governments had abandoned their proposal to build a centralized high-temperature incinerator (HTI) to destroy hazardous waste,[38] and Australia's ratification of the *Basel Convention on the Control of Transboundary Movements of Hazardous Waste and Their Disposal 1992*,[39] in effect removed the option of exporting the HCB waste to any overseas destruction facility (except in exceptional circumstances.)[q] In 1994, HCB was included in the National Strategy for the Management of Scheduled Waste, and a stakeholder body, the National Advisory Body on Scheduled Wastes (NAB) given the task of consulting with the local community and negotiating a national management plan for the HCB stockpile.

In 1996, the Federal and State ministers adopted the HCB Management Plan,[40] which was given effect through a chemical control order (CCO) under State legislation. However, a final decision on whether the waste would be destroyed on site or moved elsewhere was left to further consultations with the local community.

[n]Interview with the Midland Bus Company manager, March 15, 2001, Perth.

[o]Authors personal collection, May 2000.

[p]The sale of HCB seed dressings was withdrawn in 1972 and the use of such preparations was later prohibited in all Australian States.[37,pp 32-34]

[q]In June 1996, Amendment to the Hazardous Waste (Regulation of Exports & Imports) Act 1989 were enacted to reflect the obligations of the Basel Convention not to export hazardous waste for final disposal. See s18A, Division 3, Part 2.

In early 2001, Orica released their proposal to build a facility at the Botany Industrial Park (BIP) to treat the HCB stockpile. The BIP was a large petrochemical manufacturing complex covering 73 hectares and situated 11 kilometers south of the Sydney CBD. It already housed a chloralkali plant producing chlorine, a surfactant plant manufacturing ethylene oxide and ethylene glycol, and a range of other chemical and plastic manufacturers. The BIP was surrounded by a mix of residential neighborhoods, industry, and commerce. This included a large shopping complex near the site and a number of schools and hospitals in close proximity, as well as Sydney's international airport and Port Botany, through which almost all of Sydney's commercial shipping passes.

Orica chose, based on costs and flexibility, the GeoMelt Vitrification Process, which destroys waste by reacting it with silica and alumina in steel crucibles. The waste is shredded and mixed with soil and loaded into crucibles, where it is melted by lowering electrodes progressively into the crucible. Once the melt cools it forms a vitrified glassy rock. However, as the HCB waste is decomposed at high temperatures, it also produces hydrogen chloride and other combustion off-gases, which would need to be collected and passed through a series of pollution-control devices.

The treatment technology had a history of adverse incidents, including an explosion at a trial site in Maralinga, South Australia, where the waste had been treated in situ, that is, in the ground without the use of crucibles. The technology was seen as being experimental, without sufficient scientific evidence to demonstrate safety, but with the potential to cause significant damage to human health and the environment. As the process depended on a thermal oxidiser (an incineration phase) for destruction of contaminants that survived the melt, it was viewed by many in the NGO community as an inappropriate incineration technology for the destruction of POPs.

The facility, operating 24 hours a day, seven days a week, for four years, would produce approximately 20,000 tonnes of vitrified rock needing storage or disposal. At the end of the destruction process, the HCB Management Plan required that the facility be dismantled and removed.

Participants in the HCB dispute were to a large degree defined by their proximity to the Orica site. They included local residents and community-based environmental groups, local councils, Orica's industrial neighbors, and national environmental NGOs. The Community Participation and Review Committee (CPRC) had been established in April 1997 to address the community's desire to track the implementation of the HCB management plan. The CPRC's role was to consider any matters that were within the scope of the plan that could affect the community's health or the environment,[41] including consideration of information about destruction technologies and preferred siting options, emergency planning, monitoring, compliance, and public awareness campaigns.

The CPRC community participants faced significant challenges. The impacts of information and resource disparities, so typical of toxic disputes involving local residents, were clearly evident, as were the inevitable arguments over expertise, risk and conflict of interest. Reich[5] comments that those affected by chemical and technologic conflict suddenly become involved in another world of problems, conflicts, and institutions. While they may just want to return to their previous existence, when faced with both an unwanted technology, and as in the case of the CPRC community members, a sense of responsibility towards the wider community, they actively participate in the dispute process in the hope of an environmentally just resolution.

While government institutions viewed the HCB dispute as a national problem of hazardous waste management, the Botany community provided its own definition, as a local environmental justice issue concerned with social equity. The local residents had evidence that they already faced extensive pollution, citing Orica's emissions data from Australia's National Pollutant Inventory.. Much of the residents' opposition to destruction onsite was linked to their experience of the waste holder, Orica, and the history of onsite/offsite pollution. While Orica claimed that the technology was safe and any risks acceptable, residents' experiential knowledge gave testimony to a range of spills, fires, and leaks and a well-publicized groundwater contamination plume from the Orica facilities over the past decades. Residents believed that Orica had polluted their neighborhood in the past and did not accept that the company could manage the onsite risks of the technology. They were also aware that in the past, those living in the acute hazard zone around the BIP had never been informed of the risk or the risk assessments carried out by the company.

A fundamental lack of access to information and expertise was clearly identified. Repeatedly at CPRC meetings, community participants expressed their dismay over the lack of access to full information regarding the company's ability to adequately respond to adverse incidents, and to the information and expertise they needed to assess all the risks involved. The community members wanted an independent technical expert to provide them with an impartial assessment of Orica's technical data. They argued that the CPRC process had been set in train as a form of legitimization for government-initiated processes and therefore, there was a clear responsibility for government to address this need. They were well aware of their right to information as set out in Agenda 21, and as described in the Bahia Declaration on Chemical Safety, their right to participate meaningfully in chemical decisions that affected them.[42]

In response, Orica provided a modest amount of funding ($US5,000) for an external independent expert. However, in the adversarial nature of the dispute, clear

separation between the expert and the funding was not achieved and the inevitable issue of a conflict of interest was raised.[r] The concerns were due in part to the inability to provide a perception of an "arm's length" between the independent expert and the waste holder, but also to other factors; not the least being the appearance of familiarity with Orica's technical staff, with whom the expert shared similar language and attitudes to risk.

Community participants argued repeatedly for an independent expert based on the model used in the United States Environmental Protection Agency's (U.S. EPA's) Superfund Program, where Technical Assistance Grants are provided directly to resident groups to employ their own experts.[s] In an attempt to address the inequities of information and expertise, NGO researchers initiated the development of the HCB Community Information System, utilizing a cooperative information-consolidation process. It aimed to increase the residents' capacity by ensuring credible information regarding all aspects of HCB and its destruction was delivered to CPRC community members; matched with the capacity to use and disseminate it.

In response to this problem definition, an information-systems design and development cycle was initiated. The development process was reiterative and incorporated changes reflecting the constant feedback from the CPRC participants and other users. The final HCB Community Information System was provided as a CD for residents with the greatest need, a Web site for the wider community and printouts at the local library for those without computer skills. While the HCB Community Information System could not address the inequity of financial resources and expertise, it did provide an information resource, which both informed and empowered while removing conflict over basic data. Yet, the issue of confidentiality for commercial business information (CBI) remained a concern. With exemptions for CBI and trade secrets in Australian legislation, and the lack of a specific right-to-know Act, certain information could never be obtained.

ENVIRONMENTAL JUSTICE AND RISK ASSESSMENT IN TOXIC DISPUTES

The two community campaigns clearly demonstrate the three categories of inequities[44] so typical of environmental justice issues:

- procedural inequity evident in the WA Government's refusal to accept the Bellevue community as a stakeholder in the ongoing contamination issue and their refusal to consider residents' concerns;
- geographic inequity, with the suburbs of Bellevue and Botany carrying the burdens of waste disposal but accruing very few of the benefits; and
- social inequity where environmental decision making simply mirrored the power arrangements of the broader society, leaving the poorer communities to become, in effect, "sacrifice zones."

While it is usually accepted that environmentally sound decision making requires reliable, comprehensive, and accessible information, in the context of toxic disputes, there is rarely frank or open exchange of information. The issue of participants' rights to information remains fundamental to the resolution of chemical conflicts, as the concentration of information, and thereby power, usually resides with select industry and government groups. The extensive protection for CBI is provided with little consideration for the interests of affected communities. Reliance on freedom of information (FOI) legislation to deliver community right to know is also not warranted, as all Australian FOI Acts protect the confidentiality of a range of widely characterized commercial data.[45]

The incorporation of expertise was another contentious issue in the case studies. However reassuring the notion is of a "neutral, unaligned objective scientific expert," this was not borne out by the experience of the community. While, the community's views of expertise are colored by the increased commercialization and the secrecy surrounding waste technologies, the close relationship and institutional ties between regulators, industry, and the risk assessor also compound mistrust.[46]

Most importantly, the case studies demonstrate many limitations and inequities in the assessment of chemical risks. They support the view that "ultimately, the issue is not risk, but power; the power to impose risks on the many for the benefit of the few."[5] Many in the affected communities saw risk assessment simply as a powerful tool used by industry and government after the event to dismiss community concerns and provide legitimation for predetermined action.

The case studies also demonstrated that power influences the acceptability of risk, with each definition of risk making a distinct political statement regarding what society should value.[47] It is those with power (economic, informational, expert[48]) who define what is of value and subsequently, what is an "acceptable risk."

In regulatory assessment in Australia, the community has little input into decisions of acceptability. There has been no public debate or NGO forum in which the community can participate in discussion about acceptable risk. The regulatory agencies provide little information about how decisions regarding acceptable risk are made, and there are no standard levels of risk. The U.S. EPA refers to a one in 1,000,000 chance (10^{-6}) of developing cancer as a low risk, whereas the probabilistic determinations of "acceptable risk" in Australia may

[r]This issue was raised by the representative of BEW at CPRC Meeting of 16 May, 2000 and by representatives of the Eastern Region Environment Watch at CPRC Meeting of the 6 August, 2001.

[s]For a description of Technical Advisory Grants see U.S. Environmental Protection Agency Program Office of Emergency and Remedial Response.[43,p 79]

vary from one in 10,000 to one in 1,000,000 according to the hazard and the regulatory authority involved.

The reduction of risk from a complex, contextual, and relational reality for the community to a set of numerical data, which can be mathematically modeled and extrapolated by risk "experts," represents the best opportunity for policymakers to distort risk perceptions to suit underlying political and economic agendas. When risk science is held up to provide legitimation of the political policy or action, environmental injustice often follows.

A key feature of the disputes over Omex, Waste Control, and Orica was distrust of the experts' attempt to communicate actual or potential risk from industrial accidents and waste facilities. The risk communicators in all case unanimously told a story of "acceptable" or "no" risk. In some cases, government toxicologists claimed that risk was insignificant when the science did not support the claim. In other cases, the verdict of no risk was at odds with the residents' experiential knowledge.

In both case studies, the communities were well aware that the level of accuracy that risk analysis can achieve depends on the availability and quality of toxicity data for individual chemicals in a variety of media (water soil and air), as well as their interactions. Residents continued to point out that the cocktail of chemicals and their synergistic reactions were simply being ignored. A further criticism of risk assessment was that the method used offered many opportunities for "non-objective judgments" by the assessor and that the assumptions and uncertainty factors were rarely stated publicly. The wide variation in the results of differing risk assessments based on different models also reduced the community's confidence in risk assessment

When the risk assessment presented on behalf of government ignored many of the anecdotal and documented exposure incidences and pathways, and concluded that there was minimal risk, residents perceived the expert as a tool for providing legitimation to predetermined policy actions (or inactions). In all cases, the community saw it as a manipulation of science to ends other than the public interest. The affected communities rightly questioned the expert's political legitimacy.

Still, it was also evident that communities wanted a structured and inclusive process to assess chemical hazards and identify alternatives. They wanted a process that acknowledged and accepted uncertainty and was based in precaution, considering the interests of future generations.[u]

CONCLUSION

The case studies suggest five elements common to toxic disputes, which must be addressed in order to achieve equitable and environmentally just resolution. They are:

- The dialogue (consultation)
- Capacity building
- Right to know/information access
- Evaluating risk/hazards
- Experts and expertise

The first two, dialogue and capacity building, are clearly concerned with process and focus on a course of action to promote effective communication within the dispute. Through capacity building, communities develop the skills to effectively participate in negotiating environmentally just resolutions. The other three elements represent value themes that permeate all aspects and stages of the toxic dispute. It is these elements on which the process of dialogue and capacity building must focus. The competing forces of resources, commercial and institutional power, environmental justice, and sustainability influence all five elements.

The order in which the elements are addressed may vary with individual disputes; however, it is evident that unless the community has both a process for dialogue and the capacity (financial, geographic, technical) to participate, then the important issues of information access, the incorporation of expert advice, and evaluation of risk have no possibility of being addressed. In the face of imposed industrial and chemical risks, community participation and empowerment provides the key to the resolution of intractable toxics disputes and the achievement of environmental justice.

While Australia is not a signatory to the Aarhus Convention on Access to Information, Public Participation in Decision-making and Access to Justice in Environmental Matters (1998), all Australian governments have committed to ESD principles and even Australia's national guidelines for environmental health risk assessment,[50] recommend community involvement in all aspects of the assessments of hazard and risk.

Still, many in government today have attitudes toward public participation and risk policies that do not reflect either national thinking or international initiatives such as the *Aarhus Convention* or the U.K. House of Lords findings on community, science, and risk. The practice of top-down hierarchical management by technocrats, driven by risk-based policies, continues and remains the antithesis of the participatory decision-making process needed to achieve environmentally equitable outcomes. These current practices based on existing power structures and information restrictions, which ignore all experiential knowledge in favor of the risk sciences and their limitations, are doomed to fail. The social decision-making structures of power and privilege must be matched with implementation of the principles of environmental justice. Otherwise, society will continue to fail to address the inequitable distribution of chemical risk and thereby fail to secure environmental justice for its citizens.

[u]For an alternative process for assessing risk and hazards see Tickner et al.[49]

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