It's all rubbish: Notes on OHS in the waste industry

Prepared by: Chris Peace, Lecturer in Occupational Health and Safety, Victoria University of Wellington, and completed on 10 July 2021

Contact details: email christopher.peace@vuw.ac.nz

ORCID http://orcid.org/0000-0003-0688-6263

Plagiarism alert! Much of the following has been closely adapted from the cited reports.

The objectives of this background note are to:

(1) complement a continuing professional development webinar for NZISM members

(2) provide a preliminary research agenda for Victoria University of Wellington students carrying out a research project in partial fulfilment of the requirements for the Master's of Health (Workplace Health and Safety), providing research-based documents and legal decisions.

This work is incomplete and requires further investigation of the waste industry in New Zealand and overseas trends. With one exception, special wastes and hazardous substances have not been included.

1.1 Background

In the period 1981-2021 the collection of domestic waste in New Zealand has evolved from back-door collection of waste in metal bins by "dustmen" employed by District Councils to kerbside collection of plastic bags (manually thrown into waste compaction vehicles) and "wheely bins" (mechanically emptied into waste compaction vehicles) by contractors engaged by District Councils. The weight of each bag can range from 1kg to 10kg or more making it difficult for a collection worker to plan and execute lifting one or more bags and throwing them into a compactor truck. Similar problems can occur with collection of paper and plastic in free-of-charge plastic bags provided by District Councils.

Disposal of domestic waste also changed from uncontrolled landfill disposal of almost all waste to an emphasis on recycling. Glass bottles and jars are often stored by householders in tubs. When placed at the kerbside full tubs can be heavy (45kg or more) and overflowing, requiring considerable strength and skill to lift and tip.

Commercial waste collection also changed from many contractors each operating a few trucks with solid sides and a mesh roof into which waste was thrown, to use of waste compaction trucks by a smaller number of contractors with more emphasis on recycling.

Waste or recycling trucks may compact the contents requiring design of the mechanism to prevent crushing of workers. Often safety is assured by a safe system of work, an administrative control. Such trucks may have a platform at the rear where workers can stand while moving from street to street, posing the chance of falling from the moving vehicle.

Some small old landfills are known to contain toxic substances that may be leaching out into groundwater and waterways.

Earlier guidance on health and safety issues in the solid waste and recoverable resources industry was prepared by Waste Management Institute of New Zealand (Safety@WasteMINZ, 2007) and published jointly by ACC and the then Department of Labour. Since then, the Health and Safety in Employment Act 1992 has been replaced by the Health and Safety at Work Act 2015 and some of the standards referenced in the guide have been revised. It is understood that work may be in hand to revise some aspects of the WasteMINZ guidance.

ANZSIC codes for the waste industry

D291: Waste Collection Services

D292; Waste Treatment, Disposal and Remediation Services

1.2 Methodology

A rapid review of academic literature about the NZ waste industry and grey literature from the UK was carried out. Decisions from 231 prosecutions under the Health and Safety in Employment Act 1992

and Health and Safety at Work Act 2015, and 10 enforceable undertakings were reviewed to identify examples of harm in the waste collection and disposal industry in New Zealand.

A high-level flowchart representative of the waste industry in 2021 was developed to help structure the webinar (Figure 1). This also suggested an occupational health and safety waste industry research agenda that could be divided into each stage of waste collection, recycling and disposal and investigate what is in bins or bags that might give rise to: musculoskeletal disorders; noise; dusts; hazardous substances that could harm occupational health.

1.3 Rapid review of academic and grey literature

The rapid review of "waste industry AND Zealand AND worker safety" in the Victoria University of Wellington library found no relevant research from New Zealand (although there is a growing body of research in relation to waste minimisation and recycling). However, perhaps based on experiences during the Canterbury earthquakes, Brown et al (2010) argued that waste collection and disposal should be regarded as a lifeline utility, suggesting the need to consider OHS under abnormal or emergency circumstances. The WasteMINZ document (Safety@WasteMINZ, 2007) provides terse but highly relevant guidance on many workplace factors that could give rise to harm to workers and other people.

In contrast to the UK, no independent applied research into OHS in the NZ waste industry has been found.

A review of 955 UK Health and Safety Executive research reports covering the period 1991-2020 identified 17 of relevance. A further research report commissioned by the British Occupational Health Research Foundation on the behalf of the Environmental Services Association Education Trust (ESAET) was also found. These were mapped against the waste industry process chart (Figure 1) and used to further structure the webinar and these notes.

Figure 1. New Zealand waste industry

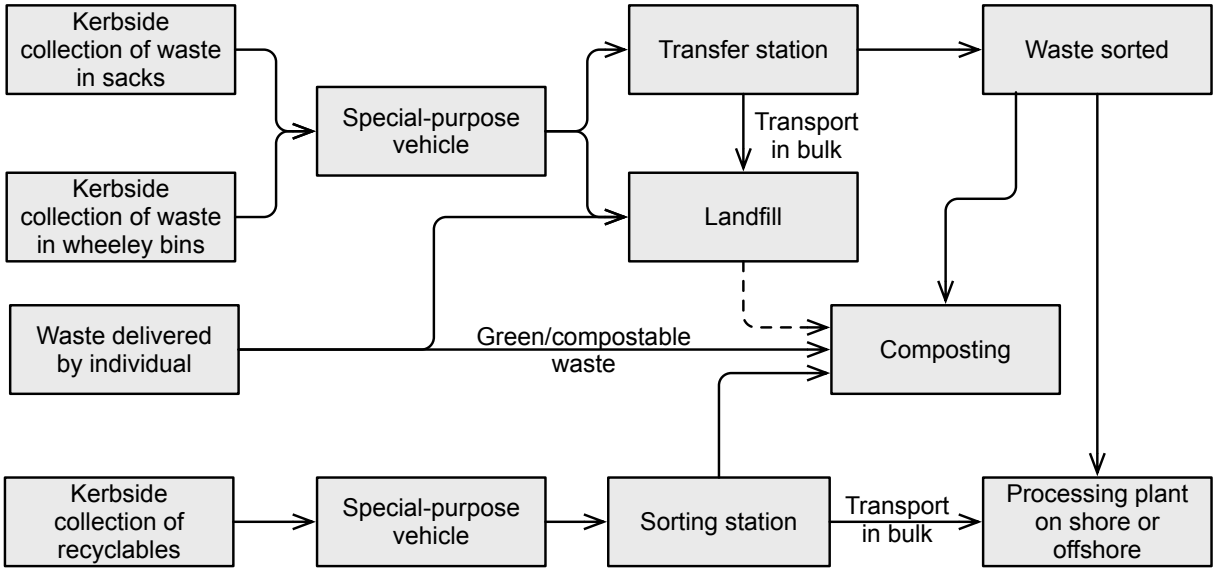

Figure 1 is a generic model for waste and recycling in NZ. "Special purpose vehicles" are those designed for use in the waste industry and may include vehicles designed and built in NZ. Waste delivered by an individual member of the public is waste taken by a person to a landfill or recycling station where it may be separated by that person or by workers. Although shown in the diagram, these notes do not discuss transport of recyclables to a workplace where they can be further processed, including packing for transport offshore.

1.4 UK research for the Health and Safety Executive

Kerb side collection – waste and recycling

Webster et al (2015) researched supervisor leader competencies in roadside waste and recycling collection, and identified problems with supervision similar to those found in NZ workplaces.

Pinder & Okunribido (2019) carried out a comparative analysis of manual handling practices in kerbside collection of recyclable waste. Uncertainty due to the composition and weight of waste and recycling bags and bins was exacerbated by both vehicle and waste collection container design: some encouraged poor handling approaches with the potential to cause MSD injuries.

Wheely bins might reduce the need to lift and throw bags of waste or recycling but require the (usually) sole operator/driver to be able to operate the lifting/emptying mechanism safely: see later in these notes.

Noise exposure from simulated roadside collection of recyclable glass (Shanks, 2007, 2008) was found to cause high noise levels (informal measurements in NZ suggest peak sound levels of 85-90 dB(C)).

Work by Turner et al (2008) provided considerable detail about occupational health and safety in collecting, transfer, treatment and processing household waste and recyclables. Their 668-page report included a risk comparator tool and guidance on good practice in avoiding harm to workers.

Landfill, composting and recycling

Sandys et al (2013) investigated dust and bioaerosol exposure at municipal waste handling sites and found that workers were directly exposed to waste materials, because only some processes could be automated and there remains a requirement for significant manual input. They reported:

> *Municipal waste contains organic matter that can have high bacterial and fungal content. Handling this material can risk exposure in particular to airborne dust and bioaerosol (airborne fungi, bacteria and their cellular components) with subsequent concerns for respiratory ill health. Direct dermal contact, or hand to mouth transfer of microorganisms could cause infection. Exposure to non-biological waste components may also affect workers' health, such as inhalation of volatile organic chemicals, or dermal/inhalation exposure to metals.*
>
> *Consequently, for a range of W&R activities there is a need for baseline occupational bioaerosol exposure data, characteristic of what can be achieved with the current exposure control practices with the controls applied*

Bioaerosol emissions from waste composting and the potential for workers' exposure were assessed by Stagg et al (2010). Emissions of bioaerosols were likely to be made airborne by mechanically handling compost and workers may therefore be at risk of considerable exposure to bioaerosols depending on their work task, their proximity to the bioaerosol source and the control measures put in place. The potential for bioaerosols generated to disperse some distance from the point source could also expose people living or working in the vicinity of waste composting sites.

Potential occupational exposure to polychlorinated dibenzo-p-dioxins and polychlorinated dibenzo furans ('dioxins') due to work-related activities led to a sampling and analysis campaign of industrial indoor air by Sweetman et al (2002). Their work included static air monitoring and personal air sampling using portable equipment in waste incineration and landfill work activities. Results from static sampling suggested excessive exposures but the personal dosimetry results were below the then recommended daily limits

Plant et al (2011) investigated control practices for workers' exposure to gases in landfill. Such gases are generated by decomposition of landfill and may contain hazardous concentrations of trace components. The study was conducted at six land fill sites identified as having the potential to generate high concentrations of three representative trace components: vinyl chloride, hydrogen sulphide and benzene. Personal task-based exposures (given the environmental conditions prevailing at the time monitoring was conducted) were insignificant for all three components and would not normally pose a health concern.

The effectiveness of in-cab air filtration in vehicles such as tractors, diggers, dumper trucks, excavators and mechanical shovels to control exposure to hazardous dust was assessed by Thorpe et al (2017). Such vehicles may be fitted with in-cab air filtration systems where drivers can potentially breathe in hazardous airborne dust, such as from waste management. However, little was known about the effectiveness of in-cab air filtration as a control measure. The factors that influence the effectiveness of in-cab air filtration systems throughout their operational lifecycle, including system design, in-service use, and maintenance were reviewed. The research found: penetration of hazardous dust into vehicle cabs; some vehicle cab filters of low efficiency; and that staff had variable

knowledge about the effectiveness of in-cab air filtration and the level of protection it afforded. The research identified practicable steps that industry can take to improve protection of workers.

Recycling sorting station

Exposure of workers to bioaerosols and dust while processing waste at materials recycling facilities was investigated by Stagg et al (2013). They found there was the potential for workers to be exposed to general airborne dust above the UK level where it is considered a substance hazardous to health (10 mg/m3 as an 8-hr TWA). Also, there is the potential for exposure to fungi and bacteria, as well as endotoxins, which are agents known to have harmful effects on human health. Endotoxin exposures may be at levels greater than the health-based limit identified by the Dutch Expert Committee on Occupational Safety of 90 EU/m3. Stagg et al (2013) concluded that the health implications of employee exposure to dust and bioaerosols was not fully considered at the sites visited. This was associated with a lack of corporate occupational health strategies and a failure to adequately manage health and hygiene provision. Areas for improvement identified included: undertaking suitable and sufficient risk assessments; adoption of well implemented, risk-based health surveillance programmes; and the provision of adequate hygiene facilities.

Analysis of injuries & fatalities in UK waste industry workplaces

Applied research by BOMEL (2004) suggested there were around 160,000 workers employed in the waste industry with a further 45,000 jobs by 2010. BOMEL found about 4,000 injuries in the waste industry each year with being struck by a refuse collection vehicle or a car the most common workplace transport accidents. An update to this research found sprains, trips and struck-by accidents were the most common types of accident (Noble Denton BOMEL Ltd, 2009).

Searl & Crawford (2012) carried out a review of health risks for workers in the waste and recycling industry and noted changes in the UK waste industry that could have led to significant changes in the nature and magnitude of the associated risks to worker health. Their work included a review of relevant published literature and small-scale survey of industry representatives about current practice in relation to health surveillance, exposure monitoring and their perceptions of the major health issues. In addition, exposure modelling was undertaken to inform the risk assessments that were undertaken for each of the hazards and processes considered.

Holmes (2010) found variable rates of sickness absence in the waste and recycling industry, with some sectors having higher rates of musculoskeletal disorders (MSDs) than others. Naylor (2014) also analysed sickness absence in the waste and recycling industry and found wide variations in MSDs and absence due to stress.

The fatal injury rate for workers in the UK waste and recycling industry (0.4% of all workers) was over three times greater than in the construction industry (6% of employees) and fifteen times greater than the average rate across all UK industries over the period 2013-2017 (Beards et al., 2018). Eighteen fatal incidents were analysed by Beards et al (2018) to identify common underlying human factors that have contributed to fatal incidents within the waste and recycling industry: 12 in enterprises with less than 250 employees, and 6 in larger enterprises. Beards et al (2018) identified four top level human factors:

(i) '*preconditions for deficit'* (ie fundamental issues) such as lack of separation of workers and hazardous machinery

(ii) '*organisational influences*' such as inadequate safety management systems and safety culture

(iii) '*individual actions'* such as tasks not being performed in the safest manner

(iv) '*wider influences'* specific to SMEs [ie, ≤250 workers] such as machinery that is supplied to them with inadequate documentation on safe operation.

The majority of factors were not specific to company size.

1.5 New Zealand enforcement action

We know that 750-900 workers die every year due to occupational disease and 50-75 due to trauma (Butchard, 2019; Cryer & Fleming, 1987; Gunby, 2011; Lilley, 2019; Lilley et al., 2020). However, hardly any of the prosecutions by WorkSafe or, previously, the Department of Labour was for occupational disease or the causal factors of occupational disease.

In the New Zealand waste industry one prosecution under the Health and Safety in Employment Act 1992 by WorkSafe followed exposure of a worker to bodily fluids who contracted hepatis B (*WorkSafe NZ v Rentokil Initial Ltd*, 2016).

Enviro Waste Services Ltd, a household refuse and recycling collection firm, was convicted of charges under ss 18 (1)(a) and 50 (1)(a) of the Health and Safety in Employment Act (*WorkSafe NZ v Enviro Waste Services Ltd*, 2016). The company was also fined $56,250 and ordered to pay court costs. On 3 March 2015 the victim, Junior Hunt, an employee of Enterprise Recruitment Limited who was contracted by ESL to provide a worker, began a collection run. After stopping for a collection on Upton Terrace in Wellington, the victim became trapped in-between the bin lifter and the centre pod of the truck. The bin lifter moves a bin of sorted glass to an opening on the top of the truck

WorkSafe NZ accepted an EU from Trojan Holdings Ltd, trading as AllWaste, after a June 2017 incident in which a worker at Cromwell's transfer station sustained a traumatic brain injury and a broken femur when he fell 3.5m into compactor pit (*WorkSafe NZ v Trojan Holdings Ltd t/a AllWaste*, 2017). He was helping unload a full skip bin from a gantry truck and, contrary to the procedure, had opened the gates above the pit. He was about to open the bin's doors when the truck began to reverse. It is not clear if he was struck by the truck or fell while trying to avoid it. The company had identified the risk of being crushed in the pit but not of a fall from height, and did not have a safe system of work.

A failure to ensure simple safety measures, such as machine guarding and supervision were in place, left a worker with severe injuries after his arm was caught in a machine used to shred tyres. Waste Management NZ Ltd specialises in waste and environmental services with sites across the country. The company was found guilty of health and safety failings at a trial in August 2020 at the Hamilton District Court (*WorkSafe NZ v Waste Management NZ Ltd*, 2020).

1.6 How to use the webinar and these notes

In practice

Get and read the HSE research report of relevance to your work, keeping in mind that section 34 requires a PCBU to "consult, co-operate with and co-ordinate activities" with other PCBUs having the same duty.

In research – towards a research agenda

We do have an out of date waste industry guide but we don't have peer reviewed research forming part of a research agenda for New Zealand covering:

- sickness absence rates in the waste industry
- numbers of workers in each ANZSIC code for the waste industry
- pragmatic monitoring equipment for noise and atmospheric contaminants
- practicable controls for any control gaps
- ACC claims per year for those ANZSIC codes
- weights of sacks of kerbside waste that workers must lift with the potential to cause MSDs
- the content of sacks or wheely bins to cause injuries or harm to health at the kerb, during handling or subsequent processing
- monitoring worker exposures to hazardous substances in the form of dust, vapours or gases
- monitoring worker exposures to noise
- monitoring worker exposures to bioaerosols
- analysis of sickness absence data to show the scale of MSDs and other health problems that result in less than seven days away from work
- comparability of the NZ *Workplace Exposure Standards and Biological Exposure Indices* (WorkSafe NZ, 2016) with the UK standards (HSE, 2020).

Other research questions may occur to you.

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