SLRCONSULTING.COM

Dangerous Fugitives

Waste Management and Occupational Exposure to Fugitive Dust

Judah Lebow – SLR Consulting NZ Ltd.

June 2025

SLR

First, Some Definitions

What do you mean, “dust”?

* Actually, no such thing as “just dust”

- Particles suspended in the air that can pose a health risk if inhaled…
- …which is basically anything that isn’t air, including

- Wood fibre
- Concrete
- Asbestos
- Metal
- Organic dust (bioaerosols)
- Sugar (yeah that’s right I said sugar)[1]

[1]Sugar Consumption Increases Susceptibility to Allergic Airway Inflammation and Activates the Innate Immune System in the Lung. Kierstein, S. et al., Journal of Allergy and Clinical Immunology, Volume 121, Issue 2, S196

What do you mean, “dust”?

It's one of many harmful respirable dusts all of which should be taken seriously Thank you

What do you mean “fugitive”?

- Any airborne particle that has escaped (get it? Fugitive!) from its intended control method/system/device.
- *In other words: an unexpected thing in an unexpected place*

What do you mean “occupational exposure”?

- Allow me to test out a potentially career-endangering over-simplification…

What do you mean “occupational exposure”?

Common Contaminants, Exposure Pathways, And Effects

No gross-out slides, promise

Exposure to What and Common Effects

	Flu-Like	Respiratory Irritation	Reduced Pulmonary Function/ Respiratory Disease	Cancer
Asbestos		X	X	X
Bioaerosols (mould, pathogens)	X	X		
Metals	X	X	X	
Respirable Crystalline Silica		X	X	X

Asbestos

Flu-Like	Respiratory Irritation	Reduced Pulmonary Function/ Respiratory Disease	Cancer
	X	X	X

- Actually, the disposal of asbestos waste is regulated
- Asbestos waste
  - Must be contained in transit
  - Must be disposed of at special facilities designed to receive it
- Receiving facilities have
  - Safety management plans
  - Well-trained staff
  - Adequate equipment (e.g. HEPA-rated cab HVAC, regularly-tested RPE)
- …and this always happens so everything's fine

RIGHT??

- ***Sydney Asbestos Crisis***
  - 79 sites used asbestos-contaminated recycled mulch
  - Included supermarkets, parks, industrial reserves, schools, hospitals
  - 102 charges laid against facility operator

- ***Broadlands Road Landfill, Taupō***
  - ~10k tonnes of contaminated concrete
  - $1.35M in cleanup fees
  - a key community recycling service permanently closed

- ***...not to mention potential exposure as landfills are exposed by erosion***
  - Pictured: former landfill at West Beach, Waitara, New Plymouth

Asbestos

Flu-Like	Respiratory Irritation	Reduced Pulmonary Function/ Respiratory Disease	Cancer
	X	X	X

- Breathing asbestos fibres into the lungs causes the buildup of scar tissue and reduction of pulmonary function. Can lead to:
  - Asbestosis;
  - Lung cancer;
  - Chronic obstructive pulmonary disease; and/or
  - Mesothelioma.
- Latency period of 5-30 years

Bioaerosols

Flu-Like	Respiratory Irritation	Reduced Pulmonary Function/ Respiratory Disease	Cancer
X	X		

- Waste collectors and composting site workers exposed to the highest levels of endotoxins
- High levels of exposure during…
  - Plant cleaning/maintenance – high level of material disturbance
  - Sorting waste after drying – material particularly susceptible to being made airborne
  - Hand sorting of batteries (look, I know this is strange but it is not a typo I swear)

Bioaerosols

Flu-Like	Respiratory Irritation	Reduced Pulmonary Function/ Respiratory Disease	Cancer
X	X		

- 13-year study of German compost workers found increased risk of chronic bronchitis-indicative symptom (phlegmy cough)
- Industrial compost workers exhibited higher prevalence of gastrointestinal symptoms, respiratory, ocular, and dermal irritation even after controlling for age and smoking habits
- And so many more studies I didn't have space for – but you get the idea.

Metals

Flu-Like	Respiratory Irritation	Reduced Pulmonary Function/ Respiratory Disease	Cancer
X	X	X	

- Tasks that can release metals into the air
  - Torch-/saw-cutting metal scrap
  - Sorting/dismantling batteries
  - Incinerating (esp. where metal content is poorly understood)

Metals

Flu-Like	Respiratory Irritation	Reduced Pulmonary Function/ Respiratory Disease	Cancer
X	X	X	

- Metals can settle on skin (dermal absorption risk)
- Metals can settle on clothes and cross-contaminate other areas (break rooms, **homes**)

- 101 New York metals recyclers – mail survey and onsite IH assessments from 2000-2001
  - More than 70% of the dust wipe samples collected in **lunchrooms and bathrooms** had lead concentrations > USEPA clearance guideline values
  - Lead was also found in wipe samples collected **after washing hands to eat lunch** from the hands of workers incl. a supervisor, torch cutter, driver, sorter, and labourer in a facility's new steel shop

Metals

Flu-Like	Respiratory Irritation	Reduced Pulmonary Function/ Respiratory Disease	Cancer
X	X	X	

- Metal fume fever/Monday fever (inhalation of metal oxides)
  - Flu-like symptoms or worse in extreme cases/long term exposure
- Lead poisoning
  - Mood disorders, headache, difficulty with memory, reproductive difficulty
  - Cross-contamination of residential spaces with “more vulnerable bio-receptors” (tamariki) and result in incurable neurological development issues

RCS

Flu-Like	Respiratory Irritation	Reduced Pulmonary Function/ Respiratory Disease	Cancer
	X	X	X

- Present in soil, sand, stone and

1. Cement
2. Concrete
3. Concrete block
4. Drywall
5. Engineered stone benchtops
6. Fibre cement products
7. Grout
8. Grunite/shotcrete
9. Mortar
10. Paints containing silica
11. Plaster
12. Rock/stone
13. Roofing tiles and pavers
14. Sand
15. Soil (fill and top soil)
16. Stucco
17. Terrazzo
18. Tile (clay, ceramic, concrete, etc.)

RCS

Flu-Like	Respiratory Irritation	Reduced Pulmonary Function/ Respiratory Disease	Cancer
	X	X	X

- Present in soil, sand, stone and
  1. Cement
  2. Concrete
  3. Concrete block
  4. Drywall
  5. Engineered stone benchtops
  6. Fibre cement products
  7. Grout
  8. Render/shotcrete
  9. Mortar
  10. Paints containing silica
  11. Plaster
  12. Rock/stone
  13. Roofing tiles and pavers
  14. Sand
  15. Soil (fill and top soil)
  16. Stucco
  17. Terrazzo
  18. Tile (clay, ceramic, concrete, etc.)

CONSTRUCTION AND DEMOLITION DEBRIS

- More likely exposure during waste collection and when working in landfills

RCS

Flu-Like	Respiratory Irritation	Reduced Pulmonary Function/ Respiratory Disease	Cancer
	X	X	X

- ***Exposure to respirable crystalline silica in the construction industry—do we have a problem?*** David McLean, Bill Glass, Andrea ‘t Mannetje, Jeroen Douwes, New Zealand Medical Journal, 1 December 2017.
  - 39 personal samples collected from cross-section of workers engaged in tasks performed on Christchurch rebuild construction sites expected to entail exposure to respirable crystalline silica.

- Almost half of the personal crystalline silica samples exceeded the New Zealand Workplace Exposure Standard (NZ WES)
  - 56% exceeded the more stringent international recommendation (ACGIH TLV)
- The tasks associated with the highest RCS levels were concrete grinding and cutting
- Two of four static samples collected close to (silica-containing) Linea board cutting exceeded the ACGIH TLV for RCS, indicating the potential for bystander exposure

RCS

Flu-Like	Respiratory Irritation	Reduced Pulmonary Function/ Respiratory Disease	Cancer
	X	X	X

- Breathing asbestos fibres into the lungs causes the buildup of scar tissue and reduction of pulmonary function. Can lead to:
  - Silicosis;
  - Lung cancer; and/or
  - Chronic obstructive pulmonary disease.
- Latency period of 5-30 years

Does this seem similar to asbestos?

Oh good that means you're paying attention.

Current Controls

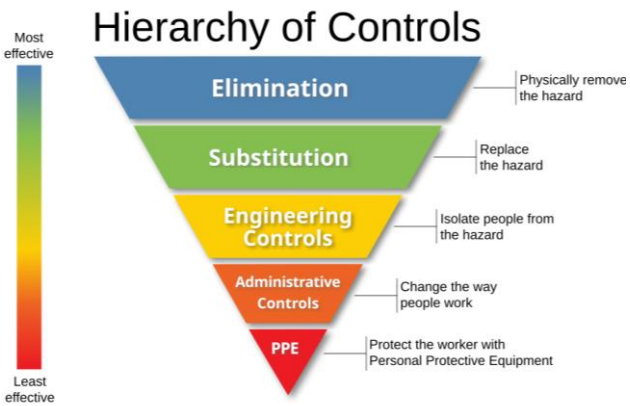
...and some ways to improve

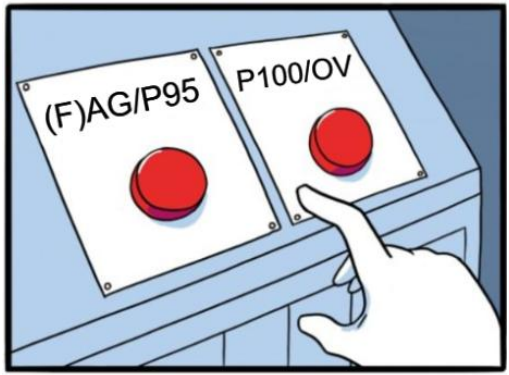
Current Controls – The “Classic”

- HVAC systems and wetting
  - Need to be properly designed, verified
  - Tempting to revert to “worker with a hose” when a more flexible solution required

Current Controls - Personal protective equipment!

- Everyone knows how to use it…
  - PPE is the least effective risk control
  - Even the professionals don’t know how to use it.
  - You/r employees probably do not know how to use it
  - How to choose appropriate PPE?





Current Controls - In-cab air filtration!

- Can be very effective if selected and used properly but
  - Rolling down window to communicate because site is loud
  - Requires regular maintenance of seal integrity
  - Tracking dust on shoes/clothes into the cab
  - How to select correct filter?

Current Controls - Asbestos

- Asbestos - Code of Honour Underwriting Regulations (C.H.U.R.)
  - Relies on a high level of trust and competency through the entire “chain of custody”
    - From the site to the truck to the receiving facility
  - Is not backed by a commensurately high level of enforcement – and how could it?
  - Plenty of recent examples of non-compliance discovered too late

...and some ways to improve – Full Metal Hygiene

- Surface preparation before cutting scrap metal – 100 mm either side of cut line
  - Cut in the middle of the prepped area!
- Preference mechanical cutting devices (shears, saws) that will not heat potentially lead-containing metals/metal coatings past the point of vapourisation

...and some ways to improve – Biofilters!

- May already be using these for off-site effects/odour mitigation ("out there")
- But also great for "in here"
- (as long as "in here" doesn't mean where bioaerosols are being drawn from)

...and some ways to improve – доверяй, но проверяй

- Personal exposure sampling
  - PPE correctly selected for the contaminants/concentrations present?
  - Are controls working?
- Area sampling
  - is HVAC operating appropriately?
- Not all surrogate contaminants are created equal – e.g. particulate matter may not be an accurate bellwether for bioaerosols

...and some ways to improve – доверяй, но проверяй

- Periodic surface sampling of truck cab
  - Test in-cab filtration system
- Periodic surface sampling of clothes, “clean areas”, and post-decontamination hands
  - Test controls/decontamination procedures are working correctly



...and some ways to improve – доверяй, но проверяй

- Periodic load testing
  - For goodness sake do ***not*** use NIR scanners for asbestos
- Asbestos receipts
  - Ask for waste certifications for LLACS
  - Ask for asbestos survey and/or clearance certification for construction and demolition debris (or proof material came from a structure built after 2000)

...and some ways to improve – Awareness-Raising

- WasteMINZ LLACS guidance (December 2024) - truck drivers transporting LLACS should (must?) have asbestos awareness training
- Effective communication - don't let a risk management plan be an obstacle to good risk management "on the ground" (e.g. PPE use)

...and some ways to improve – One Last Novel Approach

- Innovative guidelines, for example *Managing asbestos at construction and demolition waste recycling facilities* (Government of Western Australia, Department of Water and Environmental Regulation, 2021)
- Considers >0.001 % w/w asbestos to be positive for asbestos
  - GAMAS currently considers soil with <0.001 % w/w and detection of asbestos to require handling controls (yes, yes for removal, don't @ me bro)
  - Health and Safety at Work (Asbestos) Regulations 2016 doesn't have a mechanism for considering low-level asbestos contamination in built materials
- Offers clear suggestions on periodic air monitoring, load inspection methodology/frequency

Do you have any questions?