Asbestos Waste – Just How Big?

Approx. **200 million tonnes** produced since 1900*

Total contaminated waste = **4 billion tonnes**  
(based on 5% asbestos)

In 2011, NZ sent **2.5 million tonnes** of waste to landfill

At current NZ rates – **1625 years** of waste !!!!!

Asbestos Remediation in the Cook Islands

A long-term solution for making schools safe

Dr Terri-Ann Berry
Purpose

To challenge the current choices of long-term disposal options for asbestos contaminated materials (ACM)
Key Points

1. The global use of asbestos
2. The current situation with asbestos use and disposal in the Cook Islands
3. The long term disposal options for ACMs
Why Use Asbestos?

• Fibrous silicate-based minerals – serpentine & amphibole (LaDou et al. 2010)
• ACBM - Strong, heat and fire resistant, electrical insulators (Godish, 1989)
Health Issues from Asbestos

Dangerous microscopic fibres

- Asbestosis
- Lung cancer
- Mesothelioma

- Long latency period (up to 50 years)

(Haynes, 2010)
### International Ban Asbestos Secretariat

55 countries have banned all forms of asbestos (out of 196)

<table>
<thead>
<tr>
<th>Country</th>
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<tbody>
<tr>
<td>Algeria</td>
<td>Czech Republic*</td>
<td>Iceland</td>
<td>Malta*</td>
<td>Serbia</td>
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<td>Argentina</td>
<td>Denmark</td>
<td>Ireland</td>
<td>Mozambique</td>
<td>Seychelles³</td>
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<td>Australia</td>
<td>Egypt</td>
<td>Israel</td>
<td>Netherlands</td>
<td>Slovakia*</td>
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<tr>
<td>Austria</td>
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<td>Italy</td>
<td>New Caledonia</td>
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<td>Belgium</td>
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<td>Spain</td>
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<td>Brunei</td>
<td>Gabon</td>
<td>Korea (South)</td>
<td>Poland</td>
<td>Sweden</td>
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<td>Bulgaria</td>
<td>Germany</td>
<td>Kuwait</td>
<td>Portugal*</td>
<td>Switzerland</td>
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<td>Chile</td>
<td>Greece*</td>
<td>Latvia</td>
<td>Qatar</td>
<td>Turkey</td>
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<td>Croatia</td>
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<td>Lithuania*</td>
<td>Romania</td>
<td>United Kingdom</td>
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<td>Cyprus*</td>
<td>Hungary*</td>
<td>Luxembourg</td>
<td>Saudi Arabia</td>
<td>Uruguay</td>
</tr>
</tbody>
</table>

Global Use of Asbestos


Increasing use in developing countries (Dooley, 2012)
The Cook Islands

- 15 islands spread over 2 000 000 km²
- Rarotonga is the largest with 15 000 permanent residents
Asbestos Use in the Cook Islands

SPREP survey estimated that 3% of the houses plus a significant number of public buildings (inc. schools) contained ACM (SPREP, 2015)

= 89 houses
Asbestos Use in Schools

Avatea and Nikao Maori schools selected for reconstruction but contaminated materials and soil found on site.

Find solutions for removal and disposal (currently no legislation or policy) to protect health as children most vulnerable (Cooney & Conway, 2013)
School Priority

Priority given to removal from schools but ACM still entering country and other buildings affected.
Disposal Solutions

Four Main Options

- International Landfill
- Local Landfill
- Sea Disposal
- Geotextile Cladding, enclosing or encapsulation

Asbestos contaminated soil

(Tomasicchio et al. 2010)
### Enclosing, Sealing or Encapsulation

**Enclosing** – erection of airtight barrier  
**Sealing/encapsulation** – protective surface coating or internal solidification

<table>
<thead>
<tr>
<th>Advantages</th>
<th>Disadvantages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very little disturbance to the area</td>
<td>Requires careful labelling</td>
</tr>
<tr>
<td>Least potential to cause harm to human health</td>
<td>Public opposition</td>
</tr>
<tr>
<td>Successful model observed (Tomasicchio, 2010)</td>
<td>Additional long-term hazardous waste</td>
</tr>
<tr>
<td></td>
<td>High level of skill, knowledge and expertise required</td>
</tr>
<tr>
<td></td>
<td>Expensive (capping of soil)</td>
</tr>
<tr>
<td></td>
<td>Requires on-going maintenance</td>
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</tbody>
</table>
# Sea Disposal

<table>
<thead>
<tr>
<th>Advantages</th>
<th>Disadvantages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reduces human health risk</td>
<td>Establishing suitable area within EEZ</td>
</tr>
<tr>
<td>No on-going maintenance</td>
<td>Dependent on permit</td>
</tr>
<tr>
<td>Reduces pressure on landfill</td>
<td>Questionable permanency of location</td>
</tr>
<tr>
<td>Long-term storage solution</td>
<td>Public opposition</td>
</tr>
</tbody>
</table>

Cook Islands EEZ covers 1 800 000 km²
Miss Mataroa

“If It’s Not Japanese Whale Hunters, It’s Asbestos”

Cited From: [If It’s Not Japanese Whale Hunters, It’s Asbestos - Asbestos.net](http://www.asbestos.net/news/if-its-not-japanese-whale-hunters-its-asbestos/#ixzz3fipa0Qg9)
## Landfill

<table>
<thead>
<tr>
<th>Advantages</th>
<th>Disadvantages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Removes future risk to human health</td>
<td>Current landfill close to capacity</td>
</tr>
<tr>
<td>No on-going maintenance required</td>
<td>No current specialist hazardous waste disposal</td>
</tr>
<tr>
<td></td>
<td>Requires strict removal procedure to protect human health</td>
</tr>
<tr>
<td></td>
<td>Labour intensive</td>
</tr>
</tbody>
</table>

[http://www.cookislandsnews.com/item/30315-separating-rubbish-is-only-a-start/30315-separating-rubbish-is-only-a-start](http://www.cookislandsnews.com/item/30315-separating-rubbish-is-only-a-start/30315-separating-rubbish-is-only-a-start)
## International Landfill

<table>
<thead>
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<th>Advantages</th>
<th>Disadvantages</th>
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<tr>
<td>Reduces human health risk</td>
<td>Requires strict removal procedure to protect human health</td>
</tr>
<tr>
<td>No on-going maintenance</td>
<td>Labour intensive</td>
</tr>
<tr>
<td>Provides longer-term disposal solution</td>
<td>High cost for transportation</td>
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<tr>
<td>Specialise hazardous waste disposal</td>
<td>Potential quarantine issues</td>
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<tr>
<td>Overall reduction in number of disposal sites</td>
<td>Temp storage required prior to shipping</td>
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<tr>
<td></td>
<td>Reliance on external parties</td>
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</table>
Which Factors Affect Decision?

Cost
Rank 2

Public Health
Rank 1

Public Opinion
Rank 3

Longevity
Rank 4

Sustainability
Rank 5
Which Option?

- **Cost**
  - Rank 2
  - 1. Capping
  - 2. Landfill
  - 3. Sea disposal
  - 4. International

- **Public Opinion**
  - Rank 3
  - 1. International
  - 2. Landfill
  - 3. Sea disposal
  - 4. Capping

- **Public Health**
  - Rank 1
  - 1. Sea disposal
  - 2. International
  - 3. Landfill
  - 4. Capping

- **Longevity**
  - Rank 4
  - 1. International
  - 2. Landfill
  - 3. Sea disposal
  - 4. Capping

- **Sustainability**
  - Rank 5
  - 1. Sea disposal
  - 2. International
  - 3. Landfill
  - 4. Capping
**Best Option?**

<table>
<thead>
<tr>
<th>Option</th>
<th>Public Health (5)</th>
<th>Cost (4)</th>
<th>Public Opinion (3)</th>
<th>Longevity (2)</th>
<th>Sustainability (1)</th>
<th>Total</th>
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<tr>
<td>Capping</td>
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<td>8</td>
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<tr>
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<tr>
<td>Sea disposal</td>
<td>5</td>
<td>12</td>
<td>9</td>
<td>6</td>
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<td>33</td>
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</tbody>
</table>

Where value = rank x order of preference (according to each factor affecting decision)

Where the lowest number suggests the best option
Conclusions

• Enclosing, sealing or encapsulation may provide a good short term solution

• Removal and storage for later disposal recommended (at a cost of approx. $340 000)
References


• Dooley, E.E. (2012). More scientists call for an end to asbestos. Environmental Health Perspectives, 120 (9), a348-a349


References (cont.)


