The Future of Terrorism Risk and Insurance Markets

Progress in Terrorism risk modelling and its possible implications

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What the scheme covers

Commercial

Industrial

Construction

Farms with BI
Exclusions

Nuclear

Radiological
What have we modelled?

- Bomb blast, chem-bio and radiological plume in the central business districts of capital cities. (Sydney, Melbourne etc.)

- Undisclosed events in regional Australia where there are large resource projects and power generation.
Objectives of ARPC Modelling

• The scheme requires us to estimate the size of the loss soon after an event.

• By having a good understanding of PML we have been able to maximise our retrocession purchase.

• With a better understanding of our PML's we can assist in the periodic review of the scheme, especially with regard to size and desired scope of cover.
What conclusions have we drawn?

• Traditional 2 dimensional blast modelling provides a reasonable estimate of PML. 3 dimensional modelling improves on 2 dimensional modelling, providing a higher level of confidence in PML.

• That disruption of regional power supplies causes the biggest PML outside central business districts but the biggest PML to the scheme remains in the Sydney CBD.

• That chem-bio represents the worse case scenario and the current scheme could be seen to provide an inadequate financial response.

• That radiological particles were less like to travel and therefore not as significant a threat as chem-bio.
How credible is our modelling?

- The modelling has been a collaborative effort between government agencies and subject matter experts.

- The 3 dimensional blast and plume analysis has been undertaken over three years and the models are government classified property.

- The 3 dimensional model has logical variations to the traditional 2 dimensional model but the outcomes of the models are broadly aligned.

- Our evaluation of the modelling outcomes is still in its early stages and has some way to go. The models are complex but we are comforted by the quality of input, especially in ensuring the models are credible.
Impact Assessment Framework

**Hazard**
- 3D wave propagation
- Local pressure & impulse

**Exposure**
- Building Envelopes
- Building structural systems
- Value (Insured sums)

**Vulnerability**
- Fragility of facades
- Fragility of structural systems
- Fragility of non-structural components

**Impact**
- Physical Damage
- Business Interruption
ARPC 3D - Terrorism Blast Loss Estimation Report

- City name: Sydney CBD, Australia
- Location: Corner of King street and Castlereagh street
- Reporting Date & Time: 17 October 2012 9:40am
- Executive summary: Blast Magnitude: 1,000kg TNT

- Exposure: Total sum insured for buildings only
  = $3,879,100,000
- Loss: Total sum insured loss for buildings only
  = $1,251,300,000
## MLC Centre Scenario Results - 1,000kg TNT

<table>
<thead>
<tr>
<th>Address</th>
<th>Building Name</th>
<th>ARPC BSI</th>
<th>SBI</th>
<th>Loss 3D Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>19 Martin Place</td>
<td>MLC Centre</td>
<td>1186.1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>120 Pitt St</td>
<td>Commonwealth Bank</td>
<td>307.9</td>
<td>106.3</td>
<td></td>
</tr>
<tr>
<td>106 King St</td>
<td>Hardie House</td>
<td>6.8</td>
<td>6.5</td>
<td></td>
</tr>
<tr>
<td>104 King St</td>
<td></td>
<td>5.5</td>
<td>3.6</td>
<td></td>
</tr>
<tr>
<td>138_140 Pitt St</td>
<td>Sugar House</td>
<td>9.7</td>
<td>8.5</td>
<td></td>
</tr>
<tr>
<td>130 Pitt St</td>
<td>Millions House</td>
<td>87.9</td>
<td>19.5</td>
<td></td>
</tr>
<tr>
<td>122 Pitt St</td>
<td></td>
<td>35.7</td>
<td>15.6</td>
<td></td>
</tr>
<tr>
<td>39, 47 Castlereagh St</td>
<td></td>
<td>26.0</td>
<td>22.2</td>
<td></td>
</tr>
<tr>
<td>121 King St</td>
<td></td>
<td>9.8</td>
<td>2.0</td>
<td></td>
</tr>
<tr>
<td>428 George St</td>
<td>Dymocks Building</td>
<td>78.0</td>
<td>1.1</td>
<td></td>
</tr>
<tr>
<td>400 George St (podium)</td>
<td></td>
<td>42.8</td>
<td>8.9</td>
<td></td>
</tr>
<tr>
<td>142, 144 Pitt St</td>
<td></td>
<td>21.0</td>
<td>11.3</td>
<td></td>
</tr>
<tr>
<td>129 King St</td>
<td></td>
<td>7.8</td>
<td>4.0</td>
<td></td>
</tr>
<tr>
<td>73, 75 Castlereagh St</td>
<td>OCBC Building</td>
<td>112.3</td>
<td>29.5</td>
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<tr>
<td>67 Castlereagh St</td>
<td>Culwulla Chambers</td>
<td>15.0</td>
<td>6.9</td>
<td></td>
</tr>
<tr>
<td>153 King St</td>
<td>Louis Vuitton Building</td>
<td>7.8</td>
<td>7.8</td>
<td></td>
</tr>
<tr>
<td>135 King St</td>
<td>135 on King</td>
<td>164.7</td>
<td>137.7</td>
<td></td>
</tr>
</tbody>
</table>

| 147 King St           | Ashington Court     | 39.8     |     |               |
| 155 King St           | The Trust Building  | 107.7    |     |               |
| 74 Castlereagh St     | Country Centre      | 49.0     | 14.8|               |
| 113, 133 Elizabeth St | David Jones         | 86.3     | 30.2|               |
| 107, 111 Elizabeth St | St James Centre     | 307.1    | 39.1|               |
| 99 Elizabeth St       |                     | 119.1    | 28.7|               |
| 70 Castlereagh St     | Cullinan Building   | 60.3     | 41.5|               |
| 64 Castlereagh St     | Castlereagh Chambers| 67.4    | 67.4|               |
| 75 Elizabeth St       | Atanaskovic Hartnell House | 67.6 | 28.4|               |
| 60 Castlereagh St     | BNP Paribas Centre  | 114.3    | 52.6|               |
| 39, 51 Martin Place   | Colonial Building   | 67.9     | 12.2|               |
| 53 Martin Place       | Overseas Union Bank Building | 33.5 | 2.8|               |
| 60 Elizabeth St       | Heritage Building   | 88.0     | 7.1 |               |
| 165 Phillip St        | NSW Leagues Club    | 150.6    | 35.0|               |
| 82 Elizabeth St       | Berger House        | 53.3     | 7.8 |               |
| 148A, 160 King St     | University of Sydney Law School | 125.1 | 24.1|               |
| 102 Elizabeth St      | Old Supreme Court Building | 113.1 | 24.3|               |
| 48 Martin Place       | Savings Bank Building | 104.2 | 1.6|               |

Total: 3879.1 1251.3
Number of Expected Loss Amounts in Sydney
ARPC - Terrorist Plume Scenario Loss Estimation Report

City Name: Sydney CBD, Australia
Reporting Date and Time: 27/07/2012 08:55

Executive Summary

Plume Scenario: Material A - Scenario S07

Exposure:
- Total sum insured for building $17,803,854,021
- Total sum insured for content $4,022,892,823
- Total sum insured for business interruption $4,730,474,052
- Total sum insured for ALL $26,557,220,896

Loss:
- Total sum insured loss for building $755,973,382
- Total sum insured loss for content $1,109,421,456
- Total sum insured loss for business interruption $1,216,017,015
- Total sum insured loss for ALL $3,081,411,852
**ARPC - Terrorist Plume Scenario Loss Estimation Report**

City Name: Melbourne CBD, Australia  
Reporting Date and Time: 27/07/2012 12:07

**Executive Summary**

Plume Scenario: Material B - Scenario S04

**Exposure:**
- Total sum insured for building $23,854,143,271  
- Total sum insured for content $3,888,095,880  
- Total sum insured for business interruption $6,633,418,608  
- **Total sum insured for ALL** $34,375,657,759

**Loss:**
- Total sum insured loss for building $1,158,456,037  
- Total sum insured loss for content $1,183,809,183  
- Total sum insured loss for business interruption $1,774,956,105  
- **Total sum insured loss for ALL** $4,117,221,325
ARPC - Terrorist Plume Scenario Loss Estimation Report

City Name: Sydney CBD, Australia
Reporting Date and Time: 08/08/2012 13:36

Executive Summary

Plume Scenario: Material D(II) - Scenario S07

Exposure:
- Total sum insured for building $58,248,781,410
- Total sum insured for content $13,038,846,078
- Total sum insured for business interruption $14,815,228,595
- Total sum insured for ALL $86,102,856,083

Loss:
- Total sum insured loss for building $6,355,790,989
- Total sum insured loss for content $2,038,685,413
- Total sum insured loss for business interruption $4,043,318,720
- Total sum insured loss for ALL $12,437,795,122
ARPC - Terrorist Plume Scenario Loss Estimation Report

City Name: Sydney CBD, Australia
Reporting Date and Time: 08/08/2012 13:37

Executive Summary

Plume Scenario: Material D(II) - Scenario S08

Exposure:
- Total sum insured for building $70,971,171,724
- Total sum insured for content $15,368,242,443
- Total sum insured for business interruption $17,226,467,959
- Total sum insured for ALL $103,565,882,125

Loss:
- Total sum insured loss for building $61,613,765,637
- Total sum insured loss for content $13,756,750,120
- Total sum insured loss for business interruption $16,117,066,340
- Total sum insured loss for ALL $91,487,582,097