<table>
<thead>
<tr>
<th>Speed</th>
<th>Accel</th>
<th>CO</th>
<th>CO₂</th>
<th>HC</th>
<th>NO</th>
<th>Opacity</th>
</tr>
</thead>
<tbody>
<tr>
<td>55.976</td>
<td>1.535 V</td>
<td>1.84</td>
<td>13.66</td>
<td>402.2</td>
<td>1724.25</td>
<td>0.1391</td>
</tr>
</tbody>
</table>
Vehicles monitored 2003 to 2015

- Valid test results captured at the baseline monitoring sites during the 2003, 2005, 2009 and 2015 campaigns

<table>
<thead>
<tr>
<th>Site no.</th>
<th>Site name</th>
<th>Site code</th>
<th>Vehicle type</th>
<th>2015</th>
<th>2011</th>
<th>2009</th>
<th>2005</th>
<th>2003</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Light</td>
<td>38,601</td>
<td>24,382</td>
<td>22,953</td>
<td>25,389</td>
<td>9,647</td>
<td>120,972</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Heavy</td>
<td>734</td>
<td>388</td>
<td>480</td>
<td>574</td>
<td>235</td>
<td>2,411</td>
</tr>
</tbody>
</table>

Total valid test results: 120,972

Total valid test results (Heavy): 2,411
What does the Database Contain?

- **Roadside Measurements**
  - Exhaust Emissions
    - CO
    - NO
    - HC
    - UVsmoke (proxy for Particulate)
  - Vehicle Speed
  - Vehicle Acceleration
  - Photo of vehicle and number plate

- **Vehicle Details (from Motor Vehicle Register)**
  - Make, model and year of manufacture
  - Fuel type
  - Engine size
  - Mileage
  - And much more..
Format and analysis of the data base

- Microsoft Access Database – big file!
- R-code to:
  - Filter data
  - Undertake analysis
  - Produce Plots
Other information

- Owner/funder
  - The Transport Agency
  - Auckland Council
  - Ministry of Transport
  - NIWA
- Contact for Database
  - NIWA – Elizabeth Somervell (Elizabeth.Somervell@niwa.co.nz)
- Availability
  - Free
  - Required to acknowledge source and owners/funders
- Current Status
  - Internationally acknowledged as high quality and valuable
  - Hibernation (not extinction)
- Yale University Study - compare recent emissions from U.S. vehicles against non-U.S. vehicles
Light duty fleet trends
(Petrol and Diesel NZN and JPU)

- Comparison of the emissions of the 2003–2015 monitored LDV fleets
Effect of Emission Control Technology

- Comparison of the emissions of the monitored 2015 NZN petrol fleet for vehicles by emission standard
The Key Challenges

1) Equipment and software
   - Aging (12 years plus)
   - Needs maintenance or replacement

2) Funding
   - Each monitoring campaign $150k