

# Briefing for Department of Education and Training

## The Foundation's concerns about Unflued Gas Heaters



### The Foundation's Involvement in the Issue

In 2005 Asthma Foundation NSW was approached by NSW Health, who advised that following the 2004 Woolcock Institute Belmont Study they were changing their advice on this subject. Their Study showed that exposure to fumes emitted by unflued heaters, (which include Nitrogen Dioxide and Carbon Monoxide), during the first year of life was associated with an increased risk of asthma later in childhood and increased rates of coughs, colds and asthma symptoms.

They told us the National enHealth Council, of which NSW Health are a member, were issuing formal advice that people with respiratory conditions, including asthma, should consider other methods to heat their home.<sup>1</sup> Unflued gas heaters have been popular as primary heating sources in Australian homes for many years due to their ease of installation and energy efficiency, with approximately 600,000 now installed in housing and schools.

On this basis and given that the heaters are banned in other Australian states and most European countries, Asthma Foundation NSW supported this campaign and continued to do so in subsequent Winter Alert press releases. This advice is still displayed prominently on the NSW Health web site<sup>2</sup>.

The Foundation was therefore surprised and concerned when intensive media coverage in May and June 2009 indicated that unflued gas heaters remained the primary means of heating in NSW schools.

Those initial concerns were tempered by advice from our Medical and Scientific Advisory Committee (MASAC) that the research we presented was based on old high-NOx heaters, which had since been replaced by new low-NOx heaters, and that Professor Guy Marks was about to undertake a study of the health impacts of unflued heaters on behalf of the Department of Education & Training.

Given our historical interest and following approaches made to us by individuals and groups in the community we undertook further investigations. These raised many questions about the presence of unflued heaters in schools, such as the case of a teacher in Kelso who collapsed with Carbon Monoxide poisoning after a unflued low-NOx heater malfunctioned,<sup>3</sup> and more recently a GP stating publicly that children's health has been adversely affected by unflued gas heaters.<sup>4</sup>

<sup>1</sup> NSW Health Media Release, 26/8/2004 [http://www.health.nsw.gov.au/news/2004/20040826\\_00.html](http://www.health.nsw.gov.au/news/2004/20040826_00.html)

<sup>2</sup> NSW Health website [http://www.health.nsw.gov.au/factsheets/environmental/gas\\_heaters\\_fs.html](http://www.health.nsw.gov.au/factsheets/environmental/gas_heaters_fs.html)

<sup>3</sup> *Heater Danger in Schools* SMH, 4/1/2009 <http://www.smh.com.au/news/national/heater-danger-in-schools/2009/01/03/1230681813808.html>

<sup>4</sup> *Doctor blames gas heaters for illness* Blue Mountains Gazette 25/11/2009 <http://www.bluemountaingazette.com.au/news/local/news/general/doctor-blames-gas-heaters-for-illness/1687465.aspx?storypage=2>

Our research also revealed that from May 2009 all unflued heaters were being removed from schools in West Australia.

In addition to reviewing the available public evidence on the issue, summarised in his paper, the Foundation sought the view of respected interstate scientists working in the area of air quality. In part this was because the leading NSW scientist Professor Marks was engaged in the local study. The response of Professors Peter Sly and Peter Franklin from the Telethon Institute for Child Health Research are attached.

## Research Studies

Prompted by the worrying findings of numerous studies from the 90's and the early part of this decade that raised concerns over the levels of toxic gases being emitted into NSW classrooms by unflued heaters, the NSW Government undertook an ongoing program of updating the old high-NO<sub>x</sub> unflued heaters with low-NO<sub>x</sub> heaters in 2006. By mid 2009 all but 4,500 of the 46,000 high-NO<sub>x</sub> heaters in NSW schools have been replaced with low-NO<sub>x</sub> heaters at an estimated cost of \$60m.

Michael Coutts-Trotter, Director-General of the Department of Education & Training is on the public record as saying, "... properly maintained and properly operated heaters are perfectly safe", information he says he was given by NSW Health.<sup>5</sup>

However, that statement seems to contradict the advice that NSW Health gave Asthma Foundation NSW and the findings of the 2005 Hunter/ New England school study they commissioned (see below). A number of Australian and overseas studies also cast doubt on that position.

### **2003 South Australia**

In 2003, a South Australian study entitled *Randomized controlled trial of unflued gas heater replacement on respiratory health of asthmatic schoolchildren* by Pilotto et al was reported. The authors claimed that the results of this study were more conclusive than earlier ones, as they were based on a randomised control trial of unflued gas heater replacement. This method of study eliminated many of the biases seen to complicate the results of previous studies.

While previous research had shown a link between unflued gas heater exposure and asthma, this study showed asthma symptoms could be reduced following a replacement intervention that removed high exposure to NO<sub>2</sub>. The authors recommended that such a replacement should be considered a public health priority for schools using unflued gas heating during winter.<sup>6</sup>

### **CSIRO**

In 2004 the CSIRO assessed pollutant emissions from unflued gas heaters in their Room Dynamic Environmental Chamber. This paper describes the chamber assessment procedure and presents findings for major commercial heaters that are nominally "low-emission". The chamber was operated at controlled conditions of temperature, humidity, ventilation and air mixing, representative of those encountered in typical indoor environments.

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<sup>5</sup> *Banned Heaters in Schools*, SMH 28/5/2009 <http://www.smh.com.au/national/banned-heaters-in-nsw-schools-20090527-bnp9.html>

<sup>6</sup> *International Journal of Epidemiology*, Volume 33, Number 1, pp. 208-211  
<http://ije.oxfordjournals.org/cgi/content/abstract/33/1/208>

The pollutants assessed were nitrogen dioxide, carbon monoxide, formaldehyde, VOCs and respirable suspended particulates. One type of heater emitted lower levels of nitrogen dioxide, but emitted greater amounts of carbon monoxide and formaldehyde (the latter becoming significant to indoor air quality). When operated with low line pressure or slight misalignment of the gas burner, this heater became a hazardous source of these pollutants. Emissions from the heaters changed little after continuous operation for up to two months.

The study concluded that so-called Lo-NO<sub>x</sub> heaters could be "...poorly described as "low-emission" heaters from several perspectives – the levels of nitrogen dioxide emitted, the presence of formaldehyde in some emissions, and the capacity of one type of heater to emit hazardous levels of formaldehyde and carbon monoxide if operated at below the design pressure or with slight burner misalignment."

### **2005 Hunter/ New England Study**

During winter 2005 non-government schools in the Hunter New England Health Area participated in the NSW Health School Heater Surveillance Program. NSW Health initiated this pilot surveillance program in non government schools to characterise the prevalence and type of unflued gas heaters in operation, to provide support for the implementation of ventilation and maintenance policies, and help highlight any areas that may require remediation.

Significantly, testing done during the study found that both the old High-NO<sub>x</sub> and new Low-NO<sub>x</sub> heaters produced high levels of nitrogen dioxide, a poisonous gas known to induce asthma attacks and respiratory problems. The report concluded:

"...The highest concentrations of nitrogen dioxide were associated with both low-NO<sub>x</sub> and standard heaters, irrespective of any maintenance policy."

It recommended:

"...Non-government schools should consider a staged replacement of standard unflued gas heaters with flued gas or other heating types that avoid internal emissions."<sup>7</sup>

### **2008 Blue Mountains**

In May/ June 2008 the Department of Education and Training commissioned a study on unflued heaters in Blackheath Public School in the Blue Mountains, which was done using equipment supplied by the CSIRO. The testing was criticised by Professor Wayne Ferrari, an air quality expert, as the measurements were taken from the corners of the room and testing was done at four to five hourly intervals instead of from the middle of the room at one hourly intervals - actions likely to produce a more conservative result.<sup>8</sup>

Partial results were released to parents as raw data in June 2009, though never published on the Department of Education and Training website or put into a formal report. It was reported that of the ten classroom areas tested, 30% displayed levels

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<sup>7</sup> Report published on Hunter New England Area Health Service website:

<http://www1.hnehealth.nsw.gov.au/hnep/EnvironmentalHealth/UnfluedGasHeatersInSchools.htm>

<sup>8</sup> Independent air expert, Len Ferrari, quoted in *Blue Mountains Gazette* 27/5/2009

<http://www.bluemountainsgazette.com.au/news/local/news/general/government-delays-action-on-school-heaters/1524797.aspx?storypage=2>

in which NO<sub>2</sub> levels were above WHO and NPEM standards.<sup>9</sup> Other data sets have not yet been released.

### ***International Studies and Practices***

In addition to these Australian studies unflued heaters have been banned in most European countries for over 30 years, and in India and other Australian States - Victoria, Queensland and Western Australia.

Many prominent overseas organisations have also voiced their concerns. The American Lung Foundation states:

“...unvented (unflued) gas heaters are possible health hazards, and should never be the primary source of heat.”<sup>10</sup>

A 2008 John Hopkins University study funded by the National Institute of Environmental Health Sciences, the National Heart, Lung and Blood Institute and the Environmental Protection Agency compared the frequency and intensity of coughing, wheezing, shortness of breath and chest tightness to NO<sub>2</sub> levels inside the inner-city homes.

“...Use of gas stoves, space heaters or home heating with a stove or an oven, either in combination or alone, each drove up nitrogen dioxide concentrations.”

“...We were disturbed by what we saw: As nitrogen dioxide levels crept up, so did the frequency and severity of these kids’ symptoms.”

“...The pollutant worsened day and night symptoms. Each 20- point increase in nitrogen dioxide levels led to 10 percent more days of cough and 15 percent more days with limited speech due to wheezing.”<sup>11</sup>

Concern about exposure to NO<sub>2</sub> led to the US Government reducing the safe limit for NO<sub>2</sub> from 110ppb to 100ppb in January 2010.<sup>12</sup>

Despite the availability of this evidence, including a study which was commissioned by another NSW Government department, Mr Coutts-Trotter is on the public record as saying, “We’re looking for research and evidence on which we can base our decisions. My judgment was that we did need to do more research... we did need to fill that gap.”<sup>13</sup>

In the interim, the Department of Education and Training is recommending the cross ventilation of class rooms when unflued heaters are in operation. When it was pointed out that this not practicable as not all classrooms have windows on both sides of the rooms, and in regional and mountainous areas the temperatures can drop below freezing, Mr Coutts -Trotter suggested public school students who had to

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<sup>9</sup> Students exposed to dangerous gas levels

<http://www.smh.com.au/frontpage/2009/05/27/frontpage.pdf>

<sup>10</sup> The American Lung Foundation: *A Guide for Creating a Healthier Home*

[http://www.lungusa.org/atf/cf/%7B7A8D42C2-FCCA-4604-8ADE-7F5D5E762256%7D/CREATING\\_GUIDEHH.PDF](http://www.lungusa.org/atf/cf/%7B7A8D42C2-FCCA-4604-8ADE-7F5D5E762256%7D/CREATING_GUIDEHH.PDF)

<sup>11</sup> *A Longitudinal Study of Indoor Nitrogen Dioxide Levels and Respiratory Symptoms in Inner City Children with Asthma*, Hansel et al, Environmental Health Perspectives Volume 116, Number 10, October 2008 <http://www.ehponline.org/docs/2008/116-10/toc.html>

<sup>12</sup> *EPA Issues New NO<sub>2</sub> Standard* Green Car Congress 16/2/2010

<http://www.greencarcongress.com/2010/01/epano2-20090125.html>

<sup>13</sup> *Banned Heaters in Schools*, SMH 28/5/2009 <http://www.smh.com.au/national/banned-heaters-in-nsw-schools-20090527-bnp9.html>

have windows open in winter had it no worse than he did as a child at school in Britain. "There was snow outside a lot of the time, and the windows were open. We wore a jumper," he said.<sup>14</sup> Low temperatures can also exacerbate asthma symptoms.

## **A Changing International Standard**

One of the issues in this discussion of interest to the Foundation is the standard of NO<sub>2</sub> exposure that is considered safe.

Our research indicates that the WHO standard for NO<sub>2</sub> is 110 parts per billion (ppb), and WHO advise that anything above 150 ppb starts to adversely impact respiratory health.

We sought clarification of that from Professors Peter Sly and Peter Franklin who provided us with research that shows that respiratory symptoms and airway hyper responsiveness can occur with exposure to NO<sub>2</sub> at levels well below the US, WHO and NEPM standards (see attached).

Our interest – and concern - about this aspect of the issue has been further heightened by the recent announcement from the US Environmental Protection Agency (EPA), setting a one-hour NO<sub>2</sub> standard at 100ppb as the maximum allowable concentration anywhere in an area.

Greg Smith  
CEO  
16 February 2010

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<sup>14</sup> *Banned Heaters in Schools*, SMH 28/5/2009 <http://www.smh.com.au/national/banned-heaters-in-nsw-schools-20090527-bnp9.html>