STANDING COMMITTEE ON COMMUNITY AFFAIRS
References Committee
Inquiry into the impacts on health of air quality in Australia
Submission from Surf Coast Air Action and Transition Town Anglesea.

Anglesea is a small sea-side town of approximately 2500 permanent residents on Victoria's Surf Coast. It lies on the iconic Great Ocean Road, one of Australia's premier tourist destinations. Over the summer months the population swells to greater than 16 000[1]. In addition to being a popular family holiday destination, Anglesea has a number of school camp facilities which are used throughout the year by primary and secondary school children from Geelong and Melbourne. Anglesea has a primary school, occasional care, kinder and nursing home.

Alcoa's brown coal fired power station is aproximately1 kilometre from the Anglesea Primary School (completed in 2011) and town boundary.

Alcoa's open cut brown coal mine is less than 500 metres from homes in Anglesea.

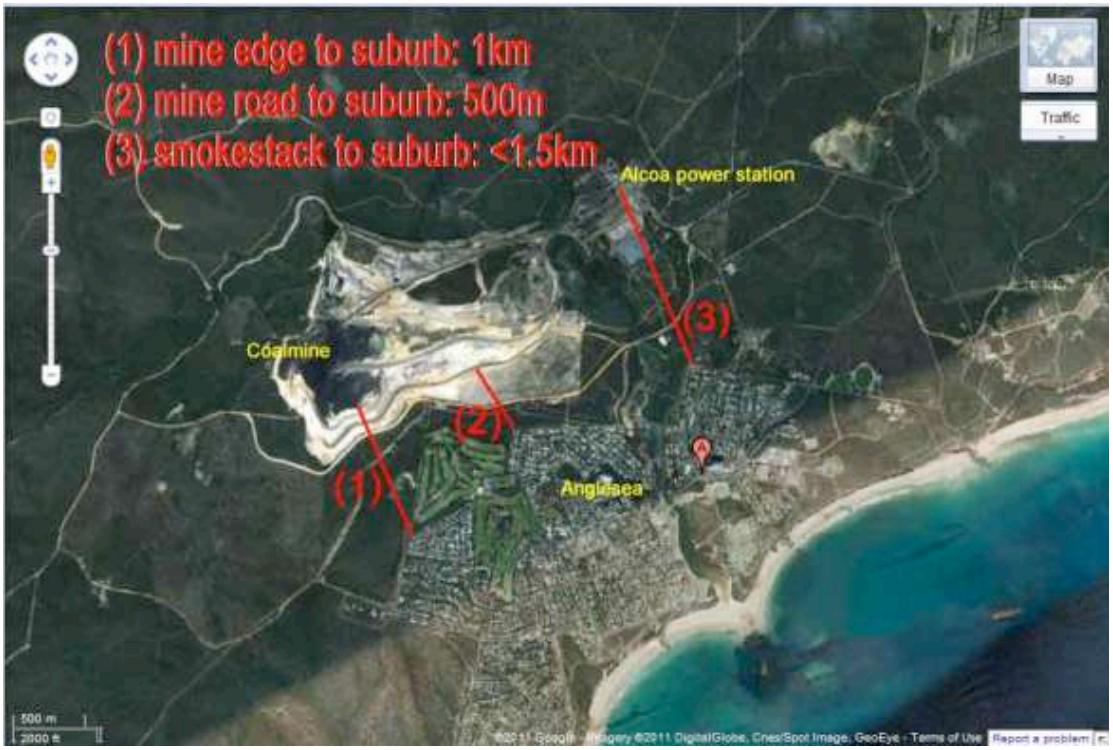


Diagram 1: Location of Coal Mine and Powerstation in Anglesea, Victoria.

Photo 1: Anglesea Primary School with smoke plume from power station.

The health of both permanent and visiting populations of Anglesea are at risk from air pollution from Alcoa's coalmine and power station due to;

- Very close proximity.
- Aging and outdated power station infrastructure, not in keeping with current best practice.
- Particulates from both the open cut coal mine and the coal fired power station.
- Very high sulpher dioxide (SO_2) emissions from the combustion of locally mined brown coal which has **10 times** the sulpher content of brown coal mined in the Latrobe Valley (3% vs. 0.3%).[2]

References:

1.Surf Coast Shire Council Anglesea Structures Plan Review Your Place Your Future

Planning for a Sustainable Anglesea Background Paper 2 – Population and Housing, Final Draft, July 2011.
http://www.Surf Coast.vic.gov.au/My_Property/Building_Planning/Planning/Strategic_Projects_Studies/Anglesea_Structure_Plan_Review

2. Alcoa of Australia Pty. Ltd. Anglesea Environment Improvement Plan, 2008.
http://www.alcoa.com/australia/en/pdf/EIP_Anglesea_0809.pdf

The impacts on health of air quality in Anglesea:

(a) particulate matter, its sources and effects.

Particulates refer to a broad group of pollutants that can enter the respiratory system in the form of fine particles. PM_{10} and $PM_{2.5}$ are the most studied, with compelling data demonstrating increased cardiorespiratory morbidity and mortality (including lung cancer) along with low birth weight, associated with both acute and cumulative exposures. An average increase in 10µg/m³ is associated with a 3-4% increase in all-cause mortality.[1]

Ultrafine particulates ($PM_{0.1}$) are potentially more hazardous, but the data remains incomplete. All subtypes are documented by-products of the mining and burning of coal, and large scale studies overseas have shown particulates to be key determinants of the adverse health effects suffered by communities in proximity to these activities.[2]

Given the proximity of Anglesea to Alcoa's open cut coal mine, from which coal dust (particulates) disperse onto the town, and the power station and stack, from which particulates are also generated, Anglesea residents are clearly at risk from acute and cumulative exposures and acute and cumulative adverse health impacts.

References:

1.Kjellstrom, Neller and Simpson Air pollution and its health impacts: the changing panorama Med J Aust 2002; 177 (11): 604-608- **https://www.mja.com.au/journal/2002/177/11/air-pollution-and-its-health-impacts-changing-panorama**

2. Castleden, Shearman, Crisp and Finch The mining and burning of coal: effects on health and the environment Med J Aust 2011; 195 (6): 333-335 https://www.mja.com.au/journal/2011/195/6/mining-and-burning-coal-effects-health-and-environment

(b) those populations most at risk and the causes that put those populations at risk.

Due to proximity, old and polluting technology, particulates and high SO_2 emissions, the entire population of Anglesea, both permanent and visiting, is at risk.

Sulphur Dioxide:

Alcoa's Anglesea power station is less then one tenth the size and output of Hazelwood power station in Victoria's LaTrobe Valley, however emits **3 times** the total volume of SO_2.

	Alcoa Anglesea **150Mw** Power Station	Hazelwood **1600Mw** Power Station
Sulphur Dioxide	**35 000 000 kg/year**	12 000 000 kg/year

Table 1: SO_2 Emissions from Anglesea and Hazelwood Power Stations. Source: National Pollutant Inventory, 2010/2011.[1,2]

In October 2011, the Victorian EPA's Principal Scientist Dr Lynette Denison wrote;

- Ambient levels of sulphur dioxide (SO_2) are associated with increases in mortality (mainly respiratory causes), hospital admissions and emergency department attendances, exacerbation of asthma and reduction in lung function.

- SO_2 has also been linked with low birth weight which is a risk factor for developmental problems.

- People with asthma and other existing respiratory disease, **the elderly (>65 years) and children** are groups within the population that are particularly sensitive to the effects of SO_2.

- The World Health Organization (WHO) and the United States Environmental Protection Agency (USEPA) have concluded that **there is no safe level of exposure to SO_2** in particular for sensitive groups.[3]

References:
1. Australian Government Department of Sustainability, Environment, Water, Population and Communities National Pollutant Inventory Alcoa Anglesea Power Station.
http://www.npi.gov.au/npidata/action/load/emission-by-individual-facility-result/criteria/state/VIC/year/2011/jurisdiction-facility/00004359

2. Australian Government Department of Sustainability, Environment, Water, Population and Communities National Pollutant Inventory International Power Hazelwood
http://www.npi.gov.au/npidata/action/load/emission-by-individual-facility-result/criteria/state/VIC/year/2011/jurisdiction-facility/00004337

3. Denison, Lynette. Victorian Civil And Administrative Tribunal Dual Gas Demonstration Project Works Approval WA 67043 Expert Report, October 2011
http://www.epa.vic.gov.au/compliance-enforcement/comments/dualgas-docs/L_Denison_Expert_Report.pdf

Anglesea Primary School:

In May 2011, Anglesea children began to attend the new Anglesea Primary School. The school is only 1.2 kilometers from the Alcoa power station and 1 kilometer from the open cut coal mine.[1,2]

Prior to building the school and in the months prior to completion the Victorian Department of Education and Early Childhood Development (DEECD) requested Air Quality and Noise Assessments of the new school site. These assessments were completed in August 2006 and December 2010 by Synergetics Environmental Engineering. Copies of the reports can be accessed through the Surf Coast Air Action website, via the weblinks listed at references 1 and 2 below.

The Synergetics assessments relied upon data supplied by Alcoa only. Prior to the Synergetics reports (and since) there has been no non-industry or EPA monitoring of pollutant levels in Anglesea. The only pollutant for which ground level concentrations have been supplied (by Alcoa) is SO_2, as continuous monitoring is required as a condition of Alcoa's license[3]. Critically, for the reports, there was no measurement of ground level concentrations of particulates. All figures and estimates (other than SO_2) rely upon modeled data, again supplied to Synergetics by Alcoa.

These assessments are inadequate. They do not provide evidence that there is not a health risk to a vulnerable population. They do not provide the grounds upon which to make decisions regarding health. It is our view that independent (non-industry, non-Alcoa dependent) monitoring should have been conducted. Furthermore, there should have been a review of the adequacy of the consultant's reports. Additionally, DEECD should have sought additional health expert opinion, including an assessment from the Department of Health.

As noted above, recent WHO[4] and USEPA Air Quality Guidelines[5,6] have reviewed and reduced the levels at which adverse health impacts occur for a number of pollutants. It is of note that the levels at which negative health effects impact upon vulnerable populations (including children), have been reduced significantly for both **SO_2 and particulates**[7]. This is of particular concern for and relevance to Anglesea.

The Synergetics report (2010) acknowledges, "The literature consistently demonstrates that PM_{10} and $PM_{2.5}$ in particular (but also NO_2, CO and **SO_2**) exert consistent, measurable adverse health effects on humans even below the current limits…The NEPM (National Environment Protection Measure) discussion paper

states that for these pollutants 'the standards have been adopted with the acknowledgement that there is a level of residual risk associated with those standards.'" The report however relies upon NEPM values (1998) to conclude that the new school site does not pose a health risk.[8] The conclusions of the Synergetics report are therefore inconsistent with the section of the NEPM discussion paper it quotes and as such is misleading and incorrect.

References:
1. Synergetics Environmental Engineering Air quality and noise assessment of a new site for the Anglesea Primary School for Department of Education and Training, 3 August 2006. http://www.angleseaairaction.org/school-site-2006.pdf

2. Synergetics Environmental Engineering Draft report: Air quality and noise assessment for the new Anglesea Primary School for Department of Education and Early Childhood Development (DEECD), 13 December 2010. http://angleseaairaction.org/attachments/article/8/school-site-2010.pdf

3. EPA Victoria Environmental Licence Alcoa of Australia Limited holder of Licence EM32162 Issued 26 June 1997 last amended 08 February 2012. https://appprod.epa.vic.gov.au/LicenceReform/LicenceView.aspx?id=216&ParentId=&ParentMode=ReadOnly

4. WHO Air Quality Guidelines Global Update 2005 Particulate matter, ozone, nitrogen dioxide and sulfur dioxide, WHO 2006 http://www.euro.who.int/__data/assets/pdf_file/0005/78638/E90038.pdf

5. USEPA (2008), Integrated Scientific Assessment, Sulfur Dioxide http://cfpub.epa.gov/ncea/cfm/recordisplay.cfm?deid=198843

6. USEPA (2008), Integrated Scientific Assessment, Particulate Matter http://cfpub.epa.gov/ncea/cfm/recordisplay.cfm?deid=216546

7. Denison, Lynette. Victorian Civil And Administrative Tribunal. Dual Gas Demonstration Project Works Approval WA 67043 Expert Report, October 2011 http://www.epa.vic.gov.au/compliance-enforcement/comments/dualgas-docs/L_Denison_Expert_Report.pdf

8. Synergetics Environmental Engineering, 2010, pg 16.

2011 extension of Alcoa's mining lease:

It is of further concern that, despite community opposition, in 2011 the Victorian State Government re-signed Alcoa's mining lease allowing for mining operations to continue for another 50 years and to expand by another 246 hectares into Anglesea heathlands, one of the richest and most biologically diverse vegetation communities in the world[1]. Coal fired power generation will of course also continue.

No baseline health study was submitted. No local health data of any sort is available.

As the mining operation expands and coal combustion continues, the current hazard to public health (and the natural environment) will intensify. Over time as the population

expands, increasing numbers of people will be exposed and their health put at risk.

Reference:
1. Geelong Environment Council, Victorian National Parks Association, ANGAIR, Friends of Eastern Otways, Anglesea Heathlands A coal mine for 50 years or protected forever? July 2011
http://angleseaairaction.org/heathland.pdf

Air Emission Study and Human Health Risk Assessment - Alcoa Anglesea Power Station:

SCAA has specific and significant concerns following the (eventual) public release of the Air Emission Study and Human Health Risk Assessment - Alcoa Anglesea Power Station.[1]

The first concern is the obvious discrepancy between the date of the report (September 2008) and the eventual release date (November 29, 2012). A more than four year delay is worth highlighting. That the report would never have been released if not for sustained pressure from Greg Barber in the Victorian Senate is of particular concern. This fact seems to have been lost during the collective back-slapping on the part of the government for their "transparency". How a report with serious implications for the health of a community, the contents of which were clearly already known to the Government and EPA, can be deliberately with-held under the auspices of a longstanding (and in this case misused) FOI exemption, is a serious issue which needs to be bought to attention.

The second point to highlight is the actual content of the report. The finer details of the predictive modeling and engineering are admittedly outside our area of expertise. However, the key element is the sulphur dioxide (SO_2) ambient monitoring data collected between 2004 and 2006 (refer to page 11 of the document).

Firstly, given SO_2 is a recognised environmental toxin and acute precipitant of asthma and respiratory symptoms in vulnerable individuals (particularly children and the elderly), the report rightly focuses primarily on ambient SO_2 air concentrations.

Secondly, the high sulphur content in coal mined from the Anglesea heathland has led to a unique feature of emissions from the Anglesea power station, namely, yearly SO_2 volumes more than three times that produced by Hazelwood power station (a notorious CO_2-emitter with 10 times the power output of Anglesea). It is therefore little wonder that Alcoa themselves were interested in learning more about their emissions and the potential for these to impact on the residents of Anglesea. The actual results are interpreted dispassionately by the report writers, but **clearly indicate multiple instances when peak hourly ambient SO_2 levels exceeded the standards mandated by the EPA**. This includes a level of 300 ppb recorded at the kindergarten and 299 ppb at the then primary school (the EPA standard is 200 ppb). For the majority of monitoring stations sulphur dioxide concentrations peaked between **11.00am and 2.00pm**, that is, when Anglesea children are outside and playing. What is not reported is the obvious additional conclusion, which is that **Anglesea residents have been regularly exposed to hazardous levels of SO_2 not just for the 3 year monitoring period, but for decades** (the power station began operation in 1961).

The third point to highlight is the subsequent response to this report. The report writer concludes **"the potential for the emissions from the power station to cause acute health effects is above the acceptance criteria... and is caused by the sulphur dioxide emissions from the stack"**. They then recommend **"that**

management/mitigation measures are adopted to reduce the acute risk posed by SO_2 emissions from the power station"[2]. Whether this led to any meaningful response from the Government or the EPA is unclear, but Alcoa has since adopted "mitigation measures" amounting to turning down the output of the power station when the prevailing winds predict increased SO_2 exposures for Anglesea residents.

Notably, in Alcoa's own Anglesea Environment Report of May 2006 they write, "…the best option for Alcoa Anglesea is installing SO_2 scrubbing technology…this solution will result in a significant reduction (50%) in SO_2 emissions."[3] In fact the installation of SO_2 scrubbing technology can reduce SO_2 emissions by up to 90%.[4] Alcoa has since decided against this "best option" based on cost. Alcoa has however installed these devices in equivalent power stations in their home country of the United States.

Despite knowing that acute (e.g., hourly average) rather than long-term (e.g., monthly) SO_2 exposure is an important respiratory health determinant, Alcoa have continued to provide only monthly ambient monitoring data on their website. **They have also neglected to monitor at the site of the new Anglesea Primary School, which sits literally in the shadow of the power station.**

The monthly data provided on Alcoa's website clearly demonstrates that SO_2 peak hourly averages, while generally below the Victorian EPA mandated 200 ppb, regularly exceed the more up-to-date USEPA guideline of 75 ppb.[5] Lynn Denison (principal EPA scientist) recently highlighted that "there are no safe levels of SO_2"[6], and the USA guidelines are clearly a response to more recent safety data accumulated from extensive worldwide experience.

Alcoa would be prohibited from operating the Anglesea power station in their home country. When specifically questioned whether Alcoa had company wide standards of best practice with regard to emission reduction, Alcoa Anglesea responded that, "…each site is operated in line with the applicable county or region's environmental laws."[7] As well as clearly demonstrating the current inadequacy of Australian emission standards, this position is held despite Alcoa's mantra of promising "best practice".

As it is a condition of their operating license, Alcoa has focused almost exclusively upon the monitoring and management of SO_2 emissions to meet the dangerously high 200ppb standard. Unfortunately, this preoccupation has meant that no other long term reduction programs have been implemented. Six monitoring stations have been located around Anglesea to provide a warning of when the 200ppb SO_2 level will be exceeded. It is expected that these stations are located to reflect the impact on all locations. However, according to EPA Victoria's regulatory modal AUSPLUME, used in the 2006 air quality and noise assessment of the new Anglesea Primary School, the peak ground level for this site is calculated to be 1.5km from the power station[8] (which, alarmingly is the position of the new school) whereas sensors are located **2km away**, a significant difference of up to 20%. This means that the published levels of $S0_2$, while already high by US and European standards, could be well below the actual levels to which Anglesea residents are being exposed.

The report clearly states that the 'acute health impacts' are limited to the impact of SO_2 alone. It makes no effort to look at the combined impact of pollutants. To limit their risk assessment to SO_2 is not just inadequate, but dangerous and irresponsible. The clear limitations of this report demonstrate Alcoa and the State Government's minimal regard for the health and safety of Anglesea residents. More galling still is the consistent stance of Alcoa PR representatives, that the power station is "safe for Anglesea residents"[9] despite well-documented scientific evidence to the contrary.

In February 2012, SCAA sought a response from both Victorian Government representatives and the agency charged with safe-guarding our natural environment to the concerns raised above. We have asked for a written response to the following questions;

- Why the government and EPA apparently colluded with a multinational corporation to with-hold an important health risk report from the Victorian citizens directly impacted by its contents?
- Why the lack of any meaningful response from both Government and EPA when made aware of the report contents back in 2008?
- When will the EPA update and tighten their SO_2 standards in line with the rest of the developed world? (EU guidelines are also far superior to ours).
- Will our elected representatives choose to put the health needs of Victorian citizens ahead of big business interests?

SCAA awaits a response with interest.

SCAA has also made several requests of the State Government for an independent air quality assessment. However, these requests seem so far to have fallen on deaf ears.

References:

1.Environ Australia Pty Ltd for Alcoa Anglesea Australia, Air Emission Study and Human Health Risk Assessment - Alcoa Anglesea Power Station. September 2008
http://vicmps.greens.org.au/sites/greens.org.au/files/Air%20Emmission%20Study%20and%20Human%20Health%20Risk%20Assessment%20Alcoa%20Anglesea.pdf

2. Environ Australia, pg 2 Executive Summary.

3.Alcoa Australia SO2 solution the action plan for Anglesea Anglesea environment report, May 2006.
http://www.alcoa.com/australia/en/pdf/Community/May_2006_Anglesea_Power_Station_Environment_Report.pdf

4. Xu, Yuan Improvement in the operation of SO2 scrubbers in China's coal power plants Environmental Science and Technology. 2011,Vol 45, 380-385
http://pubs.acs.org/doi/abs/10.1021/es1025678

5. USEPA (2008), Integrated Scientific Assessment, Sulfur Dioxide
http://cfpub.epa.gov/ncea/cfm/recordisplay.cfm?deid=198843

6. Denison, Lynette. Victorian Civil And Administrative Tribunal. Dual Gas Demonstration Project Works Approval WA 67043 Expert Report, October 2011
http://www.epa.vic.gov.au/compliance-enforcement/comments/dualgas-docs/L_Denison_Expert_Report.pdf

7.Menzies, Alexa Alcoa Anglesea Power Station Community Consultation Network CCN Meeting Minutes, Monday 3rd December, 2012.
No web link available. Document attached.

8. Synergetics Environmental Engineering Air quality and noise assessment of a new site for the Anglesea Primary School for Department of Education and Training, 3 August 2006. Pg 9, figure 9.
http://www.angleseaairaction.org/school-site-2006.pdf

9.Menzies, Pg 1.

Old and out of date infrastructure and emission standards:

Alcoa Anglesea power station was built in the early 60's with a stack height of 108meters compared to Hazelwood with a height of 255meters. This results in a higher ground concentration of pollution and would not be built today.

Alcoa can and have dramatically reduced SO_2 emissions at their US power plants by using proven scrubber technology. With regard to the Warrick power plant, scrubber technology not only reduces SO2 emissions by 98% but also provides for a 99% reduction in Hydrochloric Acid (HC1), 60% reduction in mercury (Hg), 50% reduction in Sulfuric Acid (H_2SO_4) and 49% reduction in Particulate Matter (PM). During the time of installation Alcoa boasted that employment was provided for hundreds of local contractors.[1]

Despite acknowledging scrubber technology as the "best option" for Anglesea[2], Alcoa will not invest in scrubber technology in Australia while they still comply with Australia's outdated and much higher emission standards.

References:
1, Alcoa Warrick Operations – Evansville News Newsletters, June 2008
http://www.alcoa.com/locations/usa_warrick/en/news/newsletters/june08.asp

2. Alcoa Australia SO2 solution the action plan for Anglesea Anglesea environment report, May 2006.
http://www.alcoa.com/australia/en/pdf/Community/May_2006_Anglesea_Power_Station_Environment_Report.pdf

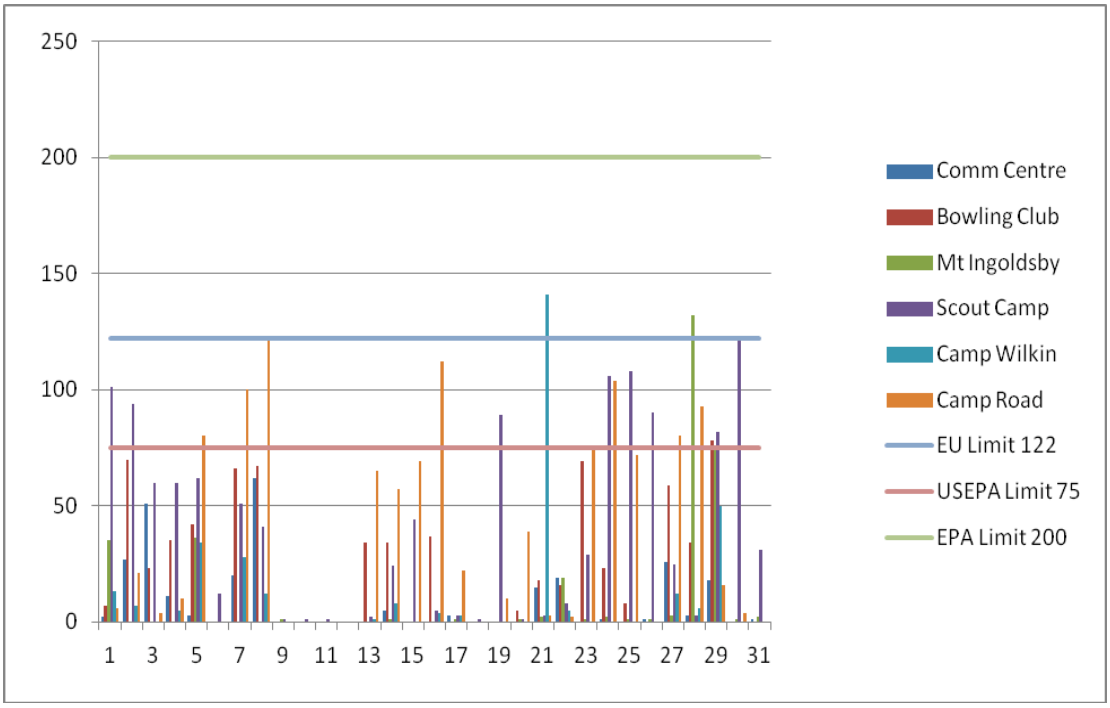
(b) the standards, monitoring and regulation of air quality at all levels of government.

WHO and USEPA have revised their air quality standards for SO_2 to reflect the growing body of international evidence about the adverse health effects of SO_2. WHO and USEPA standards are significantly more stringent than those currently in Australia's Ambient Air Quality National Environment Protection Measure (AAQ NEPM) and Victoria's State Environment Protection Policy (Ambient Air Quality) (SEPP (AAQ)).[1]

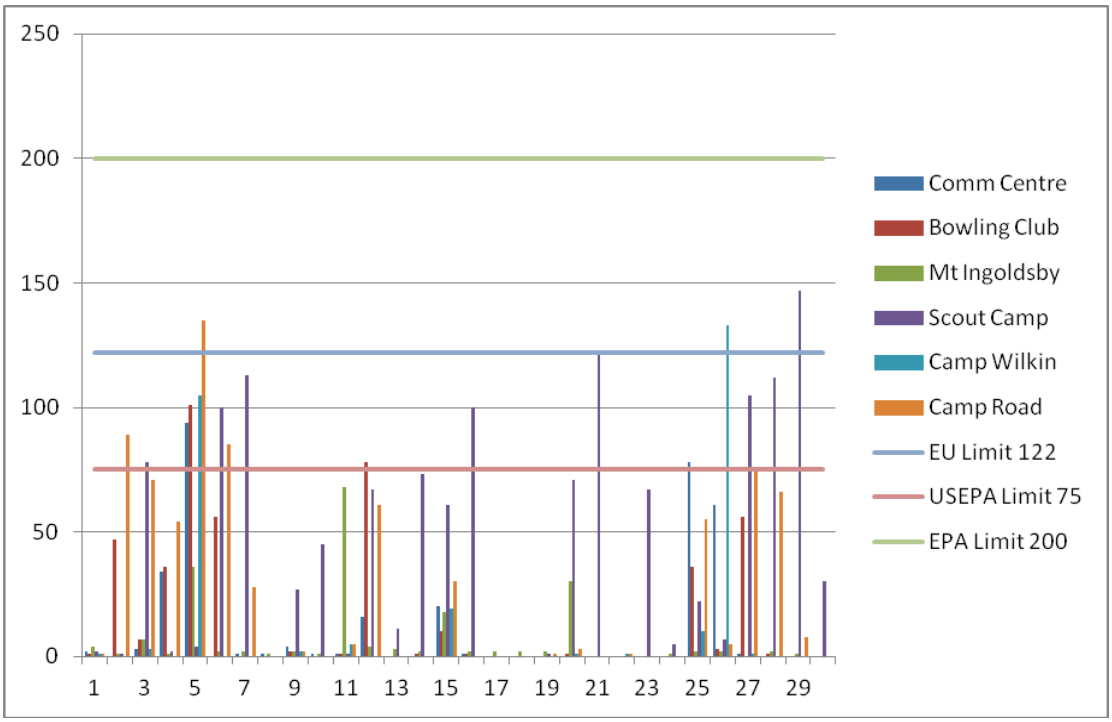
The Victorian standard for SO_2 (established in the SEPP (AAQ)) is 200ppb (parts per billion) averaged over a one hour period. The current EU standard is 122ppb and the US standard is **75ppb**.[2]

Alcoa is an American company. They can not pollute American air or their own people with the levels of SO_2 that are released in Anglesea.

Using figures released by Alcoa, the following graphs show the extent to which Alcoa breach the USEPA SO_2 standard of 75ppb and the EU standard of 122ppb. These graphs clearly illustrate the exposure and resultant health risks to Anglesea residents and visitors.



Graph 1: Peak Hourly Ambient SO2 Concentrations at Anglesea Monitoring Stations expressed as 1 hour ppb, August 2012[3]



Graph 1: Peak Hourly Ambient SO2 Concentrations at Anglesea Monitoring Stations

expressed as 1 hour ppb, September, 2012.

Although standards exist for maximum ambient levels of particulates of size PM_{10}, these are of limited value considering no actual safe level has been documented, and there is no reliable biomarker to measure real-time effect on exposed individuals[5]. There is no enforceable standard for dangerous $PM_{2.5}$ particles at a Victorian State or a Federal level, despite a conclusive body of international evidence as to their harmful effects.

Both Alcoa and the State Government are hiding behind standards which have been internationally acknowledged as inadequate in relation to sulphur dioxide and using the absence of enforced standards for $PM_{2.5}$ to ignore the risk these may pose to the community. The frustrating and irresponsibly slow process of setting fixed inflexible national standards is inconsistent with a changing knowledge base and progressive technological environment.

The AAQ NEPM has recently been reviewed by the National Environment Protection Council and recommendations have been made that the current standards in the NEPM should be changed to reflect the current understanding of the health effects of pollutants, including SO_2.[6]

Despite this review and its recommendations, and the much more stringent standards set in the US, when questioned whether Alcoa had company wide standards of best practice with regard to emission reduction, the response was that, "…each site is operated in line with the applicable county or region's environmental laws."[7] Thus clearly demonstrating the current inadequacy and inability of current Australian emission standards to reduce risk and protect health.

There are also many other toxic elements released with coal combustion - arsenic, mercury, fluorine, cadmium, lead, selenium and zinc – all of which have the potential to put the health of Anglesea residents, especially its children, at risk of both short term and long term damage.[8]

These long term risks are difficult to measure and quantify, as by definition, the health impacts may not surface for many years. **The children in Anglesea live and play close to dangerous sources of contamination and air pollution which put their developing brains, lungs and other vital organ systems at risk of both acute (immediate) and life long damage. This is a public health emergency that requires urgent and immediate attention and governmental intervention.**

References:
1.Denison, Lynette. Victorian Civil And Administrative Tribunal. Dual Gas Demonstration Project Works Approval WA 67043 Expert Report, October 2011 http://www.epa.vic.gov.au/compliance-enforcement/comments/dualgas-docs/L_Denison_Expert_Report.pdf

2. Denison, Pg 5.

3.Alcoa Anglesea Environment Report, August 2012 http://www.alcoa.com/australia/en/anglesea/anglesea_so2_report_august_2012.pdf

4.Alcoa Anglesea Environment Report, September 2012
http://www.alcoa.com/australia/en/anglesea/anglesea_so2_report_september_2012.pdf

5.Kjellstrom, Neller and Simpson Air pollution and its health impacts: the changing panorama Med J Aust 2002; 177 (11): 604-608
https://www.mja.com.au/journal/2002/177/11/air-pollution-and-its-health-impacts-changing-panorama

6. Denison, Pg 6.

7.Menzies, Alexa Alcoa Anglesea Power Station Community Consultation Network CCN Meeting Minutes, Monday 3rd December, 2012.
No web link available. Document Attached.

8. DEA Briefing from Doctors for the Environment Australia on Health, Coal Pollution and Renewable Energy, 2011
http://dea.org.au/images/general/Briefing_paper_on_coal_2011.pdf

(c) any other related matters.

The current and planned extension of Alcoa's Anglesea open cut brown coal mine will clearly and obviously impact upon Anglesea Heath. Anglesea Heath is one of the richest and most biologically diverse vegetation communities in the world, one that is home to more than 700 different plant species and a third of all orchid species found in Victoria.[1]

NATIONAL ESTATE LISTING OF ANGLESEA HEATH

The Register of the National Estate is Australia's national inventory of natural and cultural heritage places that are worth keeping for the future (Australian Heritage Commission, 2001). The Australian Heritage Commission identifies and maintains the Register of the National Estate and advises the Commonwealth Government on its protection. Places listed on the Register are assessed by the Commission and are deemed to contain components of Australia's natural and cultural environment, having aesthetic, historic, scientific or social significance or other special value for future generations or the present community (Department of Natural Resources and Environment 1998). Places listed on the Register may come from all parts of Australia and can be owned by Commonwealth, State and local governments, by businesses and private landholders. Entry into the Register is not a management decision and the way owners manage listed land is not directly affected by its listing. However, under section 30 of the Australian Heritage Commission Act 1975, the Commonwealth Government is prohibited from taking any action which would adversely affect a place in the Register. Listing on the National Estate Register means that a place has met various criteria of national significance. **The majority (6600 hectares) of Anglesea Heath is listed on the Register because of its noteworthy natural (particularly botanical) values**, see Map 2 - Boundaries. The values included in Anglesea Heath's Statement of Significance (Australian Heritage

Commission) and additional known values have been categorised for planning purposes into: natural heritage values; biodiversity conservation values; cultural heritage values; economic values; social values, and research and education values. A summary of these major values is listed below.

NATURAL HERITAGE VALUES

• The natural plant communities of the area, including Bald Hills heath, heathy woodlands and closed shrub lands are important for the presence of rare species and are of ecological value as viable examples of vegetation types that occur naturally in the region.
• The native vegetation is important for maintaining the natural habitats of associated plants and animals, in protecting the soil surface, and helping to maintain natural landforms.
• The area contains seven different vegetation communities, namely: riparian open forest (deep shaded gullies), riparian open forest (river flats and open streams), heathy open forest, heathy woodland,
Bald Hills heath, Urquhart Bluff heathland and closed shrubland.
• An exceptional wildflower display occurs in spring.
• Spectacular landscapes can be observed, particularly in the Bald Hills area.
• Significant geological, geomorphological and palaeontological features exist. Leaf fossils found within the coal mine are of international significance.
• Anglesea Heath forms part of the natural continuum between the ecosystems of the Otway Ranges and helps to protect the integrity of this biogeographical unit.

BIODIVERSITY CONSERVATION VALUES

• The heathy woodland in Anglesea Heath is the richest and most diverse vegetation community recorded in Victoria (Australian Heritage Commission, 1992).
• The native plants and animals of the area are important parts of the region's biodiversity.
• A remarkable number of flora species occur within a relatively small area: over 620 species, or approximately one-quarter of the total Victorian flora (Conservation, Forests and Lands, 1989).
• Over 100 species of native birds have been recorded in Anglesea Heath. The range of species which is attributable to the wide range of habitats in the area includes Powerful Owl (Ninox strenua) and Rufous Bristlebird (Dasyornis broadbenti).
• Twenty-nine native mammal species have been recorded in Anglesea Heath including one Victorian critically endangered species, the New Holland Mouse (Pseudomys novaehollandiae), and rare species including the Swamp Antechinus (Antechinus minimus) and the White Footed Dunnart (Sminthopsis leucopus).
• Significant flora includes eight species that are rare or threatened at the national level, and twenty that are rare or threatened at the State level. Two species, Anglesea Grevillea (Grevillea infecunda),and Anglesea Slender Sun Orchid (Thelymitrasp. aff. Pauciflora), are endemic to the area (see Appendix 2).
• Over a quarter of Victoria's orchid species are found in Anglesea Heath. Over 80 species and five hybrid species have been recorded. Accordingly, the heath claims not only State, but also national significance, for its orchid flora.
• The Anglesea River valley with its biggest tributary, Salt Creek, contains spectacular stands of swamp plants; in particular Scented Paperbark (Melaleuca squarrosa). These swampy heaths are also significant for the unusual aquatic habitat they provide, the number of rare and restricted species found and the unusual peaty

soils draining acidic waters during periods of flow.
• The waterways in Anglesea Heath provide habitat for a rare fish, Spotted Galaxias (Galaxias truttaceus), and the Southern Pygmy Perch (Nannopercas australis), which has not been recorded in any other Otway catchments east of the Gellibrand River.

CULTURAL HERITAGE VALUES
• Numerous significant archaeological sites are contained in Anglesea Heath.
• Anglesea Heath remains in a natural state, providing a spiritual connection between past, present and future generations of the Wathaurong Community and its territory.
• Anglesea Heath contributes significantly to the continuity and integrity of the South West and Wimmera Cultural Heritage Region and specifically to the Wathaurong area boundary.

ECONOMIC VALUES
• Anglesea Heath makes a significant contribution to the 'naturalness' of the Great Ocean Road experience, a draw card that attracts tourism expenditure of an estimated $241 million per annum.
• Anglesea Heath is likely to have a similar economic contribution to the region as Angahook-Lorne State Park. For example, Angahook-Lorne State Park had 539,518 visitors who spent an estimated $10.73 per person per visitor day in 1998. This amounts to $5.79 million dollars per year to the local economy (Reed Sturgess 1998).

SOCIAL VALUES
• The area offers opportunities that complement other features along the Great Ocean Road. In particular, it offers the opportunity for visitors to experience a sense of remoteness.
• People who visit Anglesea Heath value the range of recreational and leisure activities that are available.
• Anglesea Heath contributes to an enhanced quality of life for the permanent and non-permanent population of Anglesea and environs, now and for future generations.
• Anglesea Heath contributes to employment opportunities in the local community.

Areas of Special Significance
The Marshy Creek Catchment and Heathlands and the Salt Creek Catchment and Heathlands are areas which contain natural values of State significance. A summary of these values is outlined below.

A. MARSHY CREEK CATCHMENT AND HEATHLANDS
This area contains unique and regionally significant Scented Paperbark swamps; relatively intact expanses of heathy woodland with extremely high species richness (160 species per hectare). It contains a high density for threatened species, including identified areas of optimum habitat for one rare and one critically endangered mammal species.

B. SALT CREEK CATCHMENT AND HEATHLANDS
The area also contains regionally significant Scented Paperbark swamps that in this location are of State significance for the conservation of threatened species, including the Grey Goshawk. The species rich heathland and forest communities within, contain seven nationally, four State and many regionally significant flora species; intact and healthy Grass Tree stands; known occurrence of and habitat for three fauna species of

State significance, and five species of regional significance.

FLORA

The high diversity of vegetation types and the diversity of species within them are the primary reason why the majority (6600 hectares) of Anglesea Heath is listed as a significant natural place on the National Estate Register (see Map 3). Anglesea Heath contains an outstanding diversity of flora. Over 620 species, or approximately one quarter of the total Victorian flora, are represented there (Conservation, Forests and Lands, 1989). Significant flora includes three species, which are rare or threatened at a national level, and eight, which are rare or vulnerable at a State level. Two species, Anglesea Grevillea (Grevillea infecunda) and Anglesea Slender Sun Orchid (Thelymitrasp. aff. Pauciflora) are endemic to the Anglesea area (see Appendix 2). Over 80 orchid species including five hybrid species have been recorded in Anglesea Heath. Accordingly, the area is of State and national significance for its orchid flora. In addition to its floristic significance Anglesea Heath demonstrates spectacular landscape and scenic values; the wildflower displays in spring are especially noteworthy. In 1986, the former Land Conservation Council (LCC) commissioned C. Meredith (Biosis Research Pty Ltd) to produce a floristic vegetation map, showing the distribution of flora communities within Anglesea Heath. Meredith observed that there were two broad vegetation categories: heathy communities and forest communities (LCC 1987).

FAUNA

The wide range of plant communities in Anglesea Heath and their species diversity provide habitat for a range of fauna. Twenty-nine native mammal species have been recorded in Anglesea Heath including the New Holland Mouse (Pseudomys novaehollandiae), which is critically endangered in Victoria, and the rare Swamp Antechinus (Antechinus minimus). The New Holland Mouse has a restricted, disjunct distribution in Victoria and is presently found at only four localities: Anglesea, Loch Sport, Providence Ponds and Wilsons Promontory. The species was originally recorded in Anglesea Heath west of the Anglesea River (Kentish, 1982). Since 1982, its known distribution has been restricted to an area of approximately 2,300 hectares, east of the Anglesea River in Anglesea Heath and the Anglesea Flora Reserve (Lock, 1995; Mills, 1992; Wilson, 1990, 1991, 1994, 1996). Management actions identified to recover the species include: reduction and control of habitat fragmentation, enhancement of habitat at key sites through management of fire (section D.5.4), restriction of access and high impact recreation in important habitat; cat and fox control (sections D.5.2, D.7.1, D.7.2); captive breeding and possible reintroduction of captive-bred animals to Anglesea Heath. The survival of the New Holland Mouse in Anglesea Heath depends largely on the conservation and health of suitable plant communities (section D.3.1). Protection of such habitat within Anglesea Heath is therefore a high priority for land managers. A predictive spatial model for the distribution of optimum habitat for the New Holland Mouse in the Anglesea area has been developed using a Geographical Information System (GIS) (Wilson, 1997a,b; O'Callaghan, 1998; Slattery, 1998). The habitats revealed by this study will be managed to protect important habitat for the New Holland Mouse within Anglesea Heath. The Marshy Creek Special Protection Area (section D.2.5) includes sites where the New Holland Mouse has historically been recorded. These areas have also been revealed by the GIS model to be important habitat. This Marshy Creek Special Protection Area will be managed to provide habitat of optimal successional age, that

is between three to seven years post fire (Wilson, 1999). Ecological burning has been, and will continue to be, undertaken within the Anglesea Heath and adjoining areas, to provide a mosaic of optimum conditions in areas of critical habitat for threatened species (section D.5.4). Over 100 species of native birds have been recorded in Anglesea Heath, of which seven are significant (see Appendix 3). The range of species is attributable to the wide range of habitats in the area. The waterways in Anglesea Heath, particularly those close to the Anglesea River mouth, provide habitat for a rare fish, the Spotted Galaxias (Galaxias truttaceus) (section D.4.2). The Southern Pygmy Perch (Nannopercas australis), which has also been recorded in the Anglesea Heath, is not found in any other Otway catchments west to the Gellibrand River. The unusual distribution for the Southern Pygmy Perch could possibly be associated with the last glacial epoch (Atkins and Bourne, 1983; Koehn and O'Connor, 1990). There is only very limited information on the distribution, abundance and habitats of reptiles, amphibians and invertebrates within Anglesea Heath. One known rare reptile species known to occur in the area is the Swamp Skink (Egernia coventryi). Two species that occur in Anglesea Heath are listed under the Flora and Fauna Guarantee Act 1988.These species are the New Holland Mouse (Pseudomys novaehollandiae) and Rufous Bristlebird (Dasyornis broadbenti). Action Statements have been prepared for both. Further information on the distribution, ecological and management requirements of fauna, especially significant fauna, will continue to be sought.[2]

References.

1.Geelong Environment Council, Victorian National Parks Association, ANGAIR, Friends of Eastern Otways, Anglesea Heathlands A coal mine for 50 years or protected forever? July 2011
http://angleseaairaction.org/heathland.pdf

2.Parks Victoria and Alcoa World Alumina Australia, Anglesea Health Management Plan, November 2002
http://www.alcoa.com/australia/en/anglesea/anglesea_heath_management_plan.pdf

The following link is a video Surf Coast Air Action, Transition Town Anglesea and Surf Coast Energy Group have made to highlight the concerns outlined in the above submission and to fundraise for a report into the feasibility of replacing the Anglesea coal mine and power station with renewable energy sources.

http://youtu.be/dQzjss2s4QU