environmental defender's office new south wales

Submission on the *Protection of the Environment Operations (Clean Air) Regulation 2010*

July 2010

The EDO Mission Statement:

To empower the community to protect the environment through law, recognising:

- *the importance of public participation in environmental decision making in achieving environmental protection*
- *the importance of fostering close links with the community*
- *the fundamental role of early engagement in achieving good environmental outcomes*
- *the importance of indigenous involvement in protection of the environment*
- *the importance of providing equitable access to EDO services around NSW*

Contact Us

Environmental Defender's Office Ltd

Level 1, 89 York St

SYDNEY NSW 2000

freecall 1800 626 239

tel (02) 9262 6989
fax (02) 9262 6998
email: edonsw@edo.org.au
website: www.edo.org.au

For further inquiries on this matter contact Kirsty.ruddock@edo.org.au

Submitted to: Clean Air Regulation Review
Manager, Air Policy
Department of Environment, Climate Change and Water NSW
PO Box A290
Sydney South NSW 1232

Via email to CleanAirRegulationMailbox@environment.nsw.gov.au

Executive Summary

The Environmental Defender's Office of NSW (*EDO*) welcomes the opportunity to comment on the NSW Proposed *Protection of the Environment Operations (Clean Air) Regulation 2010* ('Proposed Regulation'). The EDO is a community legal centre with over 20 years experience specialising in public interest environmental and planning law. The EDO has been extensively involved in law reform and litigation relating to the impact of pollution on communities in NSW. In particular, we are involved in working with a number of communities who are facing extensive pollution issues relating to coal fired power stations, coal mines and other air quality issues.

In summary, we are concerned that the Proposed Regulation remains largely unchanged from the *Protection of the Environment Operations (Clean Air) Regulation 2002* ("the Regulation"). This is despite the fact that there is strong evidence of significant impacts on air quality and the health of residents from coal fired power stations and coal mining generally.[1] There is also considerable evidence about the impacts on the wider environment from unregulated levels of carbon dioxide being released into the air from such infrastructure, and the consequential climate change impacts. The EDO submits that insufficient action is being taken to reduce the risk to human health and prevent environmental degradation from such pollution. Section 6 of the *Protection of the Environment Operations Act 1997* states that the Department of Environment Climate Change and Water's (DECCW) objectives are to reduce to "harmless levels the discharge into the air, water or land of substances likely to cause harm to the environment" as well as set "mandatory targets for environmental improvement". We therefore call on DECCW to adopt statutory measures to reduce levels of discharge into the air to harmless levels through the Proposed Regulation.

DECCW should also fully investigate the need for widespread review of this Regulation that is informed by the current reviews into Air Quality issues being undertaken by the Department of Planning into Camberwall Village and by the NSW Health and Hunter New England Population Health looking at the health risks from power generation and open cut coal mining operations in the Hunter area. We also ask DECCW to investigate similar issues that are arising in the Lithgow area, where there is also a concentration of power infrastructure and coal mining. It is also important to bear in mind the overall framework in which the Proposed Regulation exists to ensure that other complementary mechanisms contained in other parts of the Act are also reviewed. For example, the Load Based Licensing System that is set out in the *Protection of the Environment Operations Regulations* should be reviewed to ensure all of the pollutants of concern identified below are scheduled and subject to the polluter pay principles.

In this submission we discuss the following key issues:

- pollutants of concern
- current standards
- expansion of substances covered by the regulation
- pollutant regulation in other jurisdictions

[1] See submission of Singleton Shire November 2009, Healthy Environment Group, "Is Air Quality Adversely affecting the Health of Singleton Shire Residents?" - sent to the former Environment Minister.

1. Pollutants of Concern

The pollutants listed in Table 1 were identified by the Singleton Air Quality Working Group Report[2] as being produced from mining and electricity generation and of concern to the health of their communities. A copy of that report is attached for your information. The table includes both non-hazardous and hazardous air pollutants.

Table 1 – Pollutants emitted from Power Plants

Pollutant	NSW[3]	US[4]
1. arsenic	Toxic	Hazardous
2. acetaldehyde	Toxic	Hazardous
3. ammonia		
4. antimony		
5. benzene	Toxic	Hazardous
6. beryllium and compounds	Toxic	Hazardous
7. boron compounds		
8. 1,3-butadiene	Toxic	Hazardous
9. cadmium	Toxic	
10. carbon monoxide		
11. cobalt		Hazardous
12. chromium III compounds		Hazardous
13. chromium IV compounds	Toxic	Hazardous
14. cumene		Hazardous
15. cyanide compounds		Hazardous
16. cyclohexane		
17. ethyl benzene		Hazardous
18. formaldehyde	Toxic	Hazardous
19. fluoride compounds		
20. n-hexane		Hazardous
21. ozone		
22. hydrochloric acid		Hazardous
23. lead		Hazardous
24. manganese and compounds		
25. mercury and compounds		Hazardous
26. nickel	Toxic	
27. nitrogen oxides		
28. nitrous oxides		
29. particulate matter PM2.5		
30. particulate matter PM10		
31. polycyclic aromatic hydrocarbon compounds	Toxic	Hazardous
32. selenium		Hazardous
33. sulfur oxides		
34. sulfuric acid		
35. toluene		Hazardous
36. volatile organic compounds		

[2] Singleton Air Quality Working Group Report, 'Is Air Quality Adversely Affecting the Health of Singleton Shire Residents?', 13 July 2009.

[3] Listed principal toxic air pollutants in the POEO Regulation 2002, section 20.

[4] Listed hazardous air pollutants in the Section 112 of the Clean Air regulations are published in 40 CFR Parts 61 and 63.

37. xylenes 38. zinc and compounds		

The EDO submits that all of the above pollutants as well as Carbon Dioxide should be regulated by the Regulation in NSW, which is not currently the case. We discuss this further below.

2. Current Standards

The National Environment Protection Measures (NEPMs) outline national objectives for protecting or managing particular aspects of the environment. They are broad framework-setting statutory instruments defined in the *National Environment Protection Council Act 1994*. The NEPMs set out goals such as to "improve the information base regarding ambient air toxics in order to facilitate the development of standards".[5] They set out protocols for measuring pollutants, identifying sites where there are elevated concentrations and evaluating results.

The NEPM for ambient air quality applies to carbon monoxide, nitrogen dioxide, photochemical oxidants (such as ozone), sulfur dioxide, lead and particles as PM10. The NEPM goal is to achieve National Environment Protection Standards within ten years from commencement standards.[6] The goals are listed in Table 1 of the NEPM. The commencement date for the measure was 8 July 1998 and it was amended in 2003. The NEPM for air toxics applies to mercury, PAH, benzene, toluene, xylenes and formaldehyde. The measure was made on 3 December 2004.

The EDO is particularly concerned that the Proposed Regulation does not attempt to fully incorporate the NEPM Standards. We have included at **Annexure 1** a copy of a comparison with the current Regulation and the Proposed Regulation, compared to NEPM Standards, US and WHO Standards in relation to the most common air pollutants. As is apparent from this comparison, the Proposed Regulation falls well short of these other Standards.

Protection of the Environment Operations Act 1997

Air impurity is defined under the *Protection of the Environment Operations Act 1997* (*POEO Act*) as including smoke, dust (including fly ash), cinders, solid particles of any kind, gases, fumes, mists, odours and radioactive substances. Air pollution is defined as emission into the air of any air impurity.[7]

Electricity generation from coal is a scheduled activity if the power plant has a capacity to generate greater than 30 MW of electrical power. Mineral processing including the processing or extraction of minerals from ores is a scheduled activity if there is a capacity to process more than 150 tonnes of ore per day. Mining for coal, that is, the mining, processing or handling of coal at underground or open cut mines is a scheduled activity if:[8]

(a) it has a capacity to produce more than 500 tonnes of coal per day, or

[5] Air Toxics NEPM Part 2 (5).
[6] National Environment Protection (Ambient Air Quality) Measure.
[7] POEO Act Dictionary
[8] POEO Act Schedule 1

(b) it has disturbed, is disturbing or will disturb a total surface area of more than 4 hectares of land by:

(i) clearing or excavating, or

(ii) constructing dams, ponds, drains, roads, railways or conveyors, or

(iii) storing or depositing overburden or coal (including tailings and chitter).

'Scheduled premises' means premises at which a scheduled activity is carried out.[9] Standards of concentrations for scheduled and non-scheduled premises are listed in Part 4 of the Regulation. Given the above definitions, it is possible for carbon dioxide and a whole range of toxic or hazardous pollutants to come within the definition of air impurity, the emission of which would be air pollution. The EDO's main concern with the review is that DECCW have failed to analyse whether all of these substances should be added to the Regulation to ensure that they are appropriately regulated. The Proposed Regulation does not amend the Regulation with regard to emissions from power plants. The only change to Part 4 of the Regulation is to clause 37 which concerns Group 6 afterburners, flares and vapour recovery units.

Protection of the Environment (Clean Air) Regulation 2002

With regard to pollutants produced during electricity generation it regulates solid particles ('particulate matter'), nitrogen oxides, mercury, cadmium, dioxins or furans, volatile organic compounds, and smoke (see '**Annexure "1"**'). The Regulation fails to provide any standards for ozone, lead, sulfur oxides and carbon monoxide which are among the most common air pollutants. The Regulation does not differentiate between particulate matter that has a diameter of 2.5ug or less (PM2.5) and particulate matter that has a diameter of 10ug or less (PM10) and uses the term 'solid particles' instead. The Regulation provides standards for solid particle pollutants produced from electricity generation. It lists standards for both "any activity or plant using liquid or solid standard fuel or non-standard fuel" and "any, crushing, grinding, separating or materials handling activity" and are substantially similar.

The Regulation fails to regulate the emission of these pollutants from coal- and gas-fired power stations or related activities. In particular it does not regulate carbon dioxide despite the fact that the level of carbon dioxide being admitted by industrial facilities is a large contributor to climate change. The only standards provided are for mercury and cadmium emissions from electricity generation using "non-standard fuels".

3. Why should the Proposed Regulation expand the substances regulated?

We provide our key arguments as to why the most commonly listed air pollutants that are not currently regulated should be included in the Proposed Regulation below.

Emissions from Power Plants

The potentially adverse impact of air- and water-borne environmental pollution upon the health of residents living in communities adjacent to coal related infrastructure are reportedly significant. For the residents of Lithgow, the rate of deaths before the age of 75 is almost a third greater than the NSW average. Also, prostate cancer in men and

[9] POEO Regulation, Section 20.

lung and colorectal cancer in both men and women are greater than the state average. Additionally, the number of people admitted to hospital for asthma-related illnesses is almost double the state average. Similar health statistics exist in the Hunter Valley. In addition to coal dust released from activities such as extraction, transportation and stockpiling of coal, residents are also exposed to high levels of sulphur dioxide, and have complained about "talcum-powder-like ash from mines". Sulphur dioxide has been linked to greater levels of respiratory and cardiac disease.

The Singleton Air Quality Working Group conducted a study concerning the impact of emissions from coal related infrastructure on the health of residents of Singleton Shire, in the Hunter Valley region. They called on the NSW Government in response to undertake further health studies in the region. The region contains approximately 34 mines and 3 power stations, including Bayswater and Liddell Power Stations. The study found 37 pollutants from coal mining and electricity generation including airborne particulate matter, oxides of nitrogen, carbon monoxide, total volatile organic compounds, sulphur dioxide, sulphur oxide, and hydrochloric acid.[10] In 2008, 113 tonnes of toxic metals and metalloids including antimony, arsenic, cadmium, chromium, cobalt, lead, manganese, mercury, nickel, selenium and zinc were emitted into the air of the upper Hunter from mines and power stations. Also emitted were 132,700 tonnes of sulphur dioxide and 62,600 tonnes of oxides of nitrogen.[11] That power plant emissions are composed of such substances was also noted by the US Clean Air Task Force in 2001.[12] The health impacts of major power plant pollutants are listed in Appendix 4 of the Singleton Air Quality Working Group Report.[13]

It was noted in 2000 by the United States' Clean Air Task Force that pollutants from coal-fired power plant emissions such as fine particles from reactions of oxides in the atmosphere and that such particles causes more than 603,000 asthma attacks and the deaths of 30,000 people, each year.[14]

Coal-fired power stations are the single largest contributor to anthropogenic greenhouse gas emissions. In 2008, the energy sector was the source of 416.6 Mt CO2-e or 75.8% of Australia's national inventory of emissions. Of this, 296.4 Mt of emissions were from stationary energy. The largest contribution to stationary energy is from electricity generation from coal and the increase in combustion of coal accounted for 63.4% of the

---

[10] Singleton Air Quality Working Group, 'Is Air Quality Adversely Affecting Health of Singleton Shire Residents?: An urgent call for an independent scientific study to ascertain the relative health status of residents and the risk imposed by poor air quality', 13 July 2009, p 13.

[11] Nick O'Malley, Investigations, 'Life in the shadow of coal central', The Sydney Morning Herald, 19 March 2010 quoting from the National Pollution Inventory Statistics.

[12] United States, Clean Air Task Force, 'Cradle to Grave: The Environmental Impacts from Coal', June 2001, pp 6-7, http://www.catf.us/publications/reports/Cradle_to_Grave.pdf.

[13] United States, Clean Air Task Force, 'Dirty Air, Dirty Power: Mortality and Health Damage Due to Air Pollution from Power Plants', June 2004, p 8, http://www.catf.us/publications/reports/Dirty_Air_Dirty_Power.pdf; Singleton Air Quality Working Group, 'Is Air Quality Adversely Affecting Health of Singletone Shire Residents?: An urgent call for an independent scientific study to ascertain the relative health status of residents and the risk imposed by poor air quality', 13 July 2009, pp 39-42; G.S. Plumlee and T.L. Ziegler, 'The medical geochemistry of dusts, soils, and other earth materials' in B.S. Lollar (ed.) "Environmental Geochemistry" in H.D. Holland, and K.K. Turekian, *Treatise on Geochemistry*, 2005, Elselvier: Amsterdam.

[14] United States, Clean Air Task Force, 'Cradle to Grave: The Environmental Impacts from Coal', June 2001, pp 6-7, http://www.catf.us/publications/reports/Cradle_to_Grave.pdf.; United States, Clean Air Task Force, 'Death, Disease and Dirty Power: Mortality and Health Damage Due to Air Pollution from Power Plants, October 2000, p 5, http://wag.org.au/documents/doc-117-deathdiseasedirtypower.pdf.

overall increase in emissions while combustion of gas accounted for 27.5%.[15] A heavy carbon dioxide emitter makes a meaningful contribution to climate change which in turn has a significant impact on the environment of NSW. The US Supreme Court took a similar view in the seminal case of *Massachusetts v Environmental Protection Agency*[16]. In that case, after noting that the US transportation sector accounts for more than 6% of worldwide carbon dioxide emissions the majority said:[17]

> *Judged by any standard, U.S. motor-vehicle emissions make a meaningful contribution to greenhouse gas concentrations and hence, according to petitioners, to global warming.*

Mindful of these considerations, the US Supreme Court found a sufficient causal link between emissions of greenhouse gases (**GHGs**) from automobiles in the United States and global warming (or climate change) to warrant regulation of those emissions under the *Clean Air Act 1990* (US).[18]

As for these localised impacts, there is overwhelming evidence that climate change will have a significant impact on Australia's environment and the environment in NSW. As Australia is one of the most arid continents in the world, it is particularly vulnerable to the risks of climate change. Climate change will result in much higher temperatures, stresses on water supplies, considerable drying in southern Australia, coastal erosion due to sea level rise, and more extreme weather events such as cyclones and storms, heatwaves and bushfires. Chapter 5 of the Garnaut Climate Change Review addresses the impacts of climate change on the Australian environment.[19]

The changes to climatic conditions will affect ecosystems and biodiversity in such a way that existing environmental problems will be exacerbated, such as widespread loss of native vegetation, overharvesting of water and reduction of water quality, isolation of habitats and ecosystems, and the influence of introduced plant and animal pests. For biological systems, climate change will affect: individual organisms, timing of life cycles, population processes (such as birth and death rates), shifts and changes in distribution and potential for adaptation. The ultimate outcome is expected to be a decline in biodiversity favouring weed and introduced pest species at the expense of the rich natural variety.[20]

In 2006, the NSW Government committed to reducing greenhouse gas emissions by 60% in the year 2050 and to reducing the amount of greenhouse gas emissions to the level in 2000 by 2025.[21] Mark Diesendorf states in relation to halving Australia's carbon dioxide emissions by 2040, "[t]he essential requirement for achieving these reductions in emissions is to put in place vigorous new policies and strategies now…The first key step…is to stop building new conventional coal-fired power stations and to stop extending the lifetimes of even dirtier existing coal-fired power stations".[22]

---

[15] Australian National Greenhouse Accounts, *National Greenhouse Gas Inventory: accounting for the KYOTO target*, May 2010, p 7.
[16] 549 US 1 (2007).
[17] 549 US 1 (2007) at pp 20-22.
[18] 549 US 1 (2007) at pp 20-22.
[19] See also the Climate Change in Australia website (http://www.climatechangeinaustralia.gov.au/) which is a website developed by the CSIRO and the Bureau of Meteorology and contains climate change projections for Australia.
[20] The Garnaut Climate Change Review, Chapter 6, p 141.
[21] NSW Government, State Plan: A new direction for NSW, 2006, Priority E3(b).
[22] See Diesendorf, Greenhouse Solutions with Sustainable Energy, UNSW Press: Sydney, 2007, p 57.

We call on DECCW to ensure that a limit on emissions from industrial facilities producing large amounts of carbon dioxide is included in the Proposed Regulations. Given that there is no current Federal agreement on the Carbon Pollution Reduction Scheme it is imperative that all steps are taken to reduce emissions from carbon intensive industries.

4. Pollution regulation in other jurisdictions

4.1. *US*

Comparison of the approach under the NSW Regulation with US legislation shows that NSW is not currently regulating pollutants in a comprehensive manner. We set out the main aspects of the US regime below.

Section 108 of the United States *Clean Air Act* ("**CAA**")[23] required the United States Environment Protection Authority (EPA) to publish a set of air pollutants and issue air quality criteria. Section 109 of the CAA required the EPA to set primary and secondary national ambient air quality standards for the pollutants for which air quality criteria had been issued. Primary standards set limits to protect public health, including the health of "sensitive" populations such as asthmatics, children, and the elderly. Secondary standards set limits to protect public welfare, including protection against visibility impairment, damage to animals, crops, vegetation, and buildings.

The EPA has set national ambient air quality standards ("**NAAQS**") for six common air pollutants including particulate matter, ground-level ozone, carbon monoxide, sulfur oxides, nitrogen oxides, and lead. These pollutants can harm health and the environment, and cause property damage. The NAAQS are published in 40 Code of Federal Regulations ("**CFR**") Part 50[24] and the standards are included in (see '**Annexure 2**'). EPA calls these pollutants "criteria" air pollutants because it regulates them by developing human health-based and/or environmentally-based criteria (science-based guidelines) for setting permissible levels.

Under section 112(b) of the *Clean Air Act*, Congress has listed 188 pollutants. The US Congress is required to review the list to add pollutants "which present or may present through inhalation or other routes of exposure, a threat of adverse human health effects or adverse environmental effects whether through ambient concentrations, bioaccumulation, deposition or otherwise".[25]

Carbon dioxide emissions from power plants are not yet regulated under the CAA. Section 202(a)(1) of the CAA, requires the EPA to set emission standards for "any air pollutant" from motor vehicles or motor vehicle engines "which in his judgment cause[s], or contribute[s] to, air pollution which may reasonably be anticipated to endanger public health or welfare. Following the decision in *Massachusetts v. Environmental Protection Agency*,[26] that the EPA violated the CAA by not regulating greenhouse gas

---

[23] 42 U.S.C. § 7401-7626 and consists of Public Law 159 and the amendments made by subsequent enactments.

[24] http://ecfr.gpoaccess.gov/cgi/t/text/text-idx?sid=208005192c16f7316a1d7fe7026259f1&c=ecfr&tpl=/ecfrbrowse/Title40/40cfrv2_02.tpl.

[25] US *CAA*, s 112 (a)(8).

[26] 549 U.S. 497 (2007).

emissions further work is being down to regulate greenhouse gas emissions under the CAA.[27]

The types of sources addressed under section 112 include major sources, area sources and power plants, which are called 'electric utility steam generating units'. The EPA was also required to publish a list of categories and subcategories of major sources and area sources by the end of 1991 and revise the initial list based on new information.[28] Based on a study conducted in 1998, information collected on emissions from all coal-fired power plants and a report by the National Academy of Science, the EPA issued a regulatory finding in 2000 that it is appropriate and necessary to regulate emissions from coal- and oil-fired power plants[29] and added power plants as a major source under section 112(c). It was mostly concerned with mercury emissions from power plants[30] and the health and environmental effects of mercury.

In 2005, the EPA revised the 2000 regulatory finding in a final rule and delisted the power plants from section 112(c).[31] The EPA stated they overestimated the mercury emissions from power plants and in any case were regulating emissions using the Clean Air Interstate Rule (**CAIR**) and Clean Air Mercury Rule (**CAMR**), which purported to reduce mercury emissions to levels that were not hazardous to human health. This Final Rule was decided as void by the United States Court of Appeals for the District of Columbia Circuit.[32] The Court ruled that the EPA did not have authority to delist before taking steps required under section 112(c)(9). This section only permits the EPA to remove power plants as a source when it determines that emissions from no power plant exceeds a level which is adequate to protect human health with an ample margin of safety and no adverse environmental effect will result from emissions from any power plant. As a result, the Court also made void the CAMR.

While the particular rulings under the Clean Air Act about the control of interstate pollution and other matters have been controversial and much litigated, as it stands the US system still requires the regulation of emissions of listed 188 pollutants including many from power plants.

Conclusion

NSW laws need to regulate a larger number of pollutants to ensure that the health and environment of NSW is protected from pollution from power stations. DECCW needs to seriously consider the levels contained in **Annexure 1** and adopt similar emission standards to the US and WHO Guidelines. In particular, it is also imperative that there is a limit imposed on emissions of carbon dioxide.

If you have any questions in relation to this submission please contact me on 9262 6989 or Kirsty.ruddock@edo.org.au

---

[27] 549 U.S. 497 (2007) at p 4.
[28] US *CAA*, s 112 (c)(1) and (c)(3).
[29] 65 FR 79830.
[30] Utility Study ES-27, 1998, www.epa.gov/ttn/atw/combust/utiltox/utilexec.pdf.
[31] *Revision of December 2000 Regulatory Finding on the Emissions of hazardous Air Pollutants from electric Utility Steam Generating Units and the Removal of Coal- and Oil-Fired Electric Steam Generating Units from the Section 112(c) List, Final Rule*, Federal Register, vol. 70, no. 59, 29 March 2005, p 16011 (Final Rule 2005).
[32] *State of New Jersey et. al. v Environment Protection Agency*, United States Court of Appeals for the District of Columbia Circuit, 8 February 2008.

Yours sincerely
Environmental Defender's Office (NSW) Ltd

Kirsty Ruddock
Principal Solicitor

ANNEXURE 1

Comparison of Air Pollutant Measures & Standards

Pollutant	2002 & 2010 Reg	NEPM[i]	US Standard[ii]	WHO[iii]
Particulate Matter (2.5 µm diameter)	400mg/m^3 – group 1[iv] 250mg/m^3 – groups 2, 3, 4	24 hr mean – 25 µg/m3 Annual mean – 8 µg/m3	Primary & Secondary[v] 24 hr mean[vi] – 35.0 µg/m^3 Annual mean[vii] – 15.0 µg/m^3	24 hr mean – 25.0 µg/m^3 Annual mean – 10.0 µg/m^3
Particulate Matter (10.0 µm diameter)	100mg/m^3 – group 5 50mg/m^3 – group 6	24 hr mean – 50 µg/m3 Annual Mean – N/A	Primary & Secondary 24 hr mean[viii] –150 µg/m^3 Annual mean[ix] - N/A	24 hr mean – 50.0 µg/m^3 Annual mean – 20.0 µg/m^3
Sulfur Dioxide (SO_2)	N/A for electricity generation	1 hr – 0.20 ppm 24 hr – 0.08 ppm Annual – 0.02 ppm	Primary 1hr – 0.075ppm (196.0 µg/m3) 24 hr mean – 0.14 ppm[x] (366.0 µg/m3) Annual – 0.03 ppm (78.5 µg/m3) Secondary 3 hr - 0.5 ppm (1.30 mg/m^3)	10-min mean – 500.0 µg/m3 (0.19 ppm) 24-hr mean – 20.0 µg/m3 (0.007 ppm)
Carbon Monoxide (CO)	N/A for electricity generation	8 hours – 9.0 ppm	Primary & Secondary 8-hour – 9 ppm (10 mg/m^3) 1-hour – 35 ppm (40 mg/m^3)	Guidelines recommended for WHO[xi] 15 min - 100 mg/m^3 (87 ppm) 30 min - 60 mg/m^3 (52 ppm) 1 hr - 30 mg/m^3 (26 ppm) 8 hr - 10 mg/m^3 (9 ppm)
Lead (Pb)	N/A for electricity generation	Annual – 0.50 µg/m3	Primary & Secondary Rolling 3-Month Average - 0.15 µg/m^3 Quarterly Average - 1.5 µg/m^3	N/A
Ozone (O_3)	N/A for electricity generation	Figures for all photochemical oxidants incl. ozone: 1 hour – 0.10 ppm 4 hours – 0.08 ppm	Primary & Secondary 8 hour - 0.075 ppm (2008 std) 8 hour - 0.08 ppm (1997 std) 1-hour - 0.12 ppm	8 hr mean - 100 µg/m^3 (0.05 ppm)

ANNEXURE 1

Nitrogen Dioxide (NO_2)	Any boiler in electricity generating system with a capacity of 30 MW or more: 2500 mg/m^3 - grps 1,2,3,4 800 mg/m^3- grp 5 500 mg/m^3- grp 6 Any gas turbine in an electricity generating system with a capacity of 30 MW or more: 2500 mg/m^3 - grps 1,2,3,4 70 mg/m^3- grps 5, 6 Any non-gas turbine in an electricity generating system with a capacity of 30 MW or more: 2500 mg/m^3 - grps 1,2,3,4 150 mg/m^3 - grp 5 90 mg/m^3- grp 6	1 hour – 0.12 ppm 1 year – 0.03 ppm	<u>Primary (No Secondary)</u> 1-hour - 100 ppb <u>Primary & Secondary</u> Annual - 53 ppb	1 hr mean - 200 $\mu g/m^3$ (106 ppb) Annual mean - 40 $\mu g/m^3$ (21ppb)
Mercury (Hg)	Regulated for non-standard fuel only		Expected to have standards by March 2010	N/A

24 hr mean (daily average) – guidelines based on short term health effect
Annual mean (annual average) – guidelines based on long term health effects
8-hour, 3 hour, 1 hour mean - daily maximum 8-hour, 3 hour or 1 hour average

ANNEXURE 1

---

[i] *National Environment Protection Ambient Air Quality Measure*, date commenced 1998, amended 2003.
[ii] Data obtained from US EPA website: http://www.epa.gov/air/airpollutants.html.
[iii] Data obtained from WHO website. The WHO air quality guidelines are designed to offer guidance in reducing the health impacts of air pollution. First produced in 1987 and updated in 1997, these guidelines are based on expert evaluation of current scientific evidence. http://www.who.int/mediacentre/factsheets/fs313/en/index.html; WHO, *Air quality guidelines for particulate matter, ozone, nitrogen dioxide and sulfur dioxide*: *Global Update* 2005 – Summary of Risk Assessment; Mr J. Raub, US Environmental Protection Agency, *Environmental Health Criteria 213: Carbon Monoxide* (2nd Edition) draft, http://whqlibdoc.who.int/ehc/WHO_EHC_213.pdf.
[iv] Figures same for total solid particles for both 'any activity or plant using a liquid or solid standard fuel or a non-standard fuel' or 'any crushing, grinding, separating or materials handling activity' except for group 6 where crushing or grinding standard is 20mg/m^3
[v] Primary standards set limits to protect public health, including the health of "sensitive" populations such as asthmatics, children, and the elderly. Secondary standards set limits to protect public welfare, including protection against decreased visibility, damage to animals, crops, vegetation, and buildings.
[vi] To attain this standard, the 3-year average of the weighted annual mean $PM_{2.5}$ concentrations from single or multiple community-oriented monitors must not exceed 15.0 µg/m^3
[vii] To attain this standard, the 3-year average of the 98th percentile of 24-hour concentrations at each population-oriented monitor within an area must not exceed 35 µg/m^3 (effective December 17, 2006.
[viii] Not to be exceeded more than once per year on average over 3 years.
[ix] Since 2006, no annual arithmetic mean standard owing to lack of evidence linking health problems to long term exposure to course particle pollution.
[x] Parts per million.
[xi] Not officially adopted by WHO. Who only appears to provide official guidelines for particulate matter, ozone, nitrogen dioxide and sulfur dioxide.