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Reduction of Mercury in the Environment –24th September 2015

Recently two friends, due to their long term occupational exposure, had tests undertaken to determine levels of heavy metals they may have accumulated. Specific concerns were for cobalt, cadmium, chromium and other heavy metals associated with production or artworks.

When the results were returned none of the heavy metals they were exposed to at work were found to be above normal levels.

However in both cases the level of mercury was 7 to 10 times the normal level.

They are both fish eating vegetarians also known as "pescetarians". In both cases eating fish between 5 and 7 times per week.

This prompted me to carry out some research which I will summarise as follows: -

– Mercury exists in small quantities everywhere in rocks, soil, mineral deposits etc
– As erosion occurs this mercury is released and washed into streams, lakes and oceans where it is readily absorbed by algae and converted to methyl mercury.
– Crustaceans and other small marine creatures eat this algae. They in turn are eaten by larger and larger fish such that mercury is concentrated in fish and in particular large fish such as shark, tuna and marine mammals such as whales and seals.
– This has always been the case and people who traditionally eat fish do have higher levels of mercury than non fish eaters.
– However human activity over the last 200 years has seen an increase mercury in the environment by between 2 and 10 times the pre industrial levels.
– Of significance is the level of elemental mercury as this is most readily converted to methyl mercury by marine algae.
– It is clear that increase in mercury in the environment has been a significant factor in the very high levels of mercury found in my friends.
– It is also clear that this is a global problem as the anthropogenic mercury will spread through the oceans everywhere.

So I carried out some further research on the sources of mercury and a great deal has been done to reduce mercury in the environment in most countries over the last 50 years. Attached is **"Cleaner Power Plants" (**http://www3.epa.gov/mats/powerplants.html)from the US EPA which shows how in the US significant reductions in mercury have been achieved in major segments but also how the Coal Fired Power Plants remain a major source. It is also clear from this document that the technology to remove mercury from coal fired power generation is proven and well understood.

I have also attached information produced by **John Kaye** (Greens Member of the NSW Parliament http://www.johnkaye.org.au/nsw-coal-fired-power-stations-fail-us-mercury-test/) which lists the mercury output of NSW Coal Fired Power Stations and how these compare to the US EPA Clean Air Act requirements called "Mercury and Air Toxic Standards for Power Plants" also called **"MATS"** . The NSW coal fired power stations average out at 2.64 grams of mercury per gWh compared with 0.09 grams per gWh required by **MATS**. That is more than 25 times higher!

Emission of mercury from Loy Yang is 31 Kg per annum (http://www.sourcewatch.org/index.php/Loy_Yang_A_power_station#National_Pollutant_Inventory_Data)and output of Loy Yang is 16,000 gWh which converts to 1.94 grams per gWh and

Hazelwood is similar. So both around 20 times the US Clean Air Act requirements.

Also attached is the Australian Government Department of Environment "**Mercury Emissions"** fact sheet(ttp://www.npi.gov.au/npidata/action/load/summary-result/criteria/substance/55/destination/ALL/source-type/ALL/subthreshold-data/Yes/substance-name/Mercury%2B%2526%2Bcompounds/year/2014). It is clear that Coal Fired Electricity Generation has continued to increase whereas other sources of mercury have levelled off or reduced. I also note in this fact sheet that Australia is a signatory to the **"Minamata Convention on Mercury" (http://www.environment.gov.au/protection/chemicals-management/mercury#The_Minamata_Convention_A_response_to_global_concern)** and that identified priorities for domestic action are listed including "best practice to control atmospheric mercury emissions".

It appears from the attached submission from the **"Australian Aluminium Council"** on ratification of the Minamata Convention (http://www.environment.gov.au/submissions/minimata-convention/australian-aluminium-council.pdf)that the Aluminium is excluded from the scope of the Minamata Convention which is somewhat surprising. If I understand correctly the same technology applicable to coal fired power plants can be used to remove mercury from aluminium production.

Also attached is the submission from **"Australian Coal Based Coal Generators" (http://www.environment.gov.au/submissions/minimata-convention/australian-coal-based-electricity-generators.pdf)** ratifictation of the Minamata Convention. Essentially they argue that implementation of US **MATS** to limit mercury pollution is too costly and not necessary.

I have also attached the **"National Pollution Inventory" (http://www.npi.gov.au/npidata/action/load/emission-by-source-result/criteria/substance/55/destination/ALL/source-type/ALL/substance-name/Mercury%2B%2526%2Bcompounds/subthreshold-data/Yes/year/20140)** for mercury and compounds. Some of the major sources are not anthropogenic, notably fuel reduction burning and bushfires. Paved/Unpaved Roads relates to dust and not to elemental mercury. Non Ferrous Metal Production and Electricity Generation are directly related to elemental mercury production and are of greatest concern.

Summary

Anthropogenic mercury pollution has been addressed in many areas but pollution from coal fired power stations and non ferrous metal metal production, principally aluminium, remain significant sources of mercury pollution.

However both Coal Fired Power Generators and the Australian Aluminium Council argue that they do not need to take any actions to limit levels of mercury pollution.

EPA Victoria Requested Action

1. That Coal Fired Power Stations in Victoria be required to limit mercury pollution to at least the levels required by the US MATS. That is 0.09 grams of mercury per GWH.
2. Non Ferrous Metal Production Facilities notably Aluminium be required to limit mercury pollution to similar levels as required by the US MATS.