
LEAD *Action* NEWS

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The newsletter of The LEAD (Lead Education and Abatement Design) Group Inc.
Guest Editor, Dr Chrissie Pickin. Editor-in-Chief: Anne Roberts

Rosebery: The View from the Ramparts

gardening

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1. Editorial

We can't keep meeting like this

By Anne Roberts

This newsletter is the response of various Tasmanian health, industry and municipal authorities to LEAD Action News vol 10, no.4, which was largely written by members of the community group, Tasmanian Toxic and Heavy Metals Taskforce (TTHMT) ('The view from the trenches.')

It's about Rosebery, a small lead mining town on the west coast of Tasmania, Australia.

TTHMT's newsletter was very critical of the official response to the claims by some residents of Rosebery that they had been poisoned by heavy metals; in particular, arsenic and lead.

If nothing else, the exercise is evidence of how complicated everything is, particularly the health effects of almost any substance. However, claim and counter claim are unlikely to be settled through the medium of an on-line newsletter, nor by comments on Facebook - some of which were distinctly unpleasant - by some residents who dispute that anyone has been poisoned.

Some good things have happened in Rosebery since the claims of poisoning were made. (See the last section of Dr Pickin's article 'How Government responded to concerns from Rosebery.')

LEAD Action News remains open to further contributions on Rosebery, containing new information or new recommendations, but we don't plan to devote a whole issue to it in the near future.

Speaking of news: Lead isotopes show up in air reaching California from Asia; Prof Paul Ehrlich warns of the accumulation of man-made chemicals in living tissue; Germany sets new standards for blood lead levels, and has determined that no exposure to lead is safe, and The LEAD Group has developed a [new lead poisoning prevention policy](#), which it has presented to Australia's National Health and Medical Research Council, for recommendation to national and state health ministers.

I'm going to conclude this editorial by trying to lighten up. There's a risk that this will annoy everyone, but here goes:

There seems to be no reason for tourists to be afraid to visit Rosebery and the surrounding district because of a dispute over what effect being a mining town has had on the health of some residents and their pets.

Rosebery is not radioactive. It hasn't got asbestos fibres floating in the air.

The climate can be a bit cool, but it's *Tasmania*, after all. Tasmania's climate is described as 'cool temperate.' If you need protective clothing in Rosebery, it's likely to be a jumper, scarf and wind jacket, warm socks, and so forth. (I'm guessing at this. One photo in this issue shows a person in shorts.)

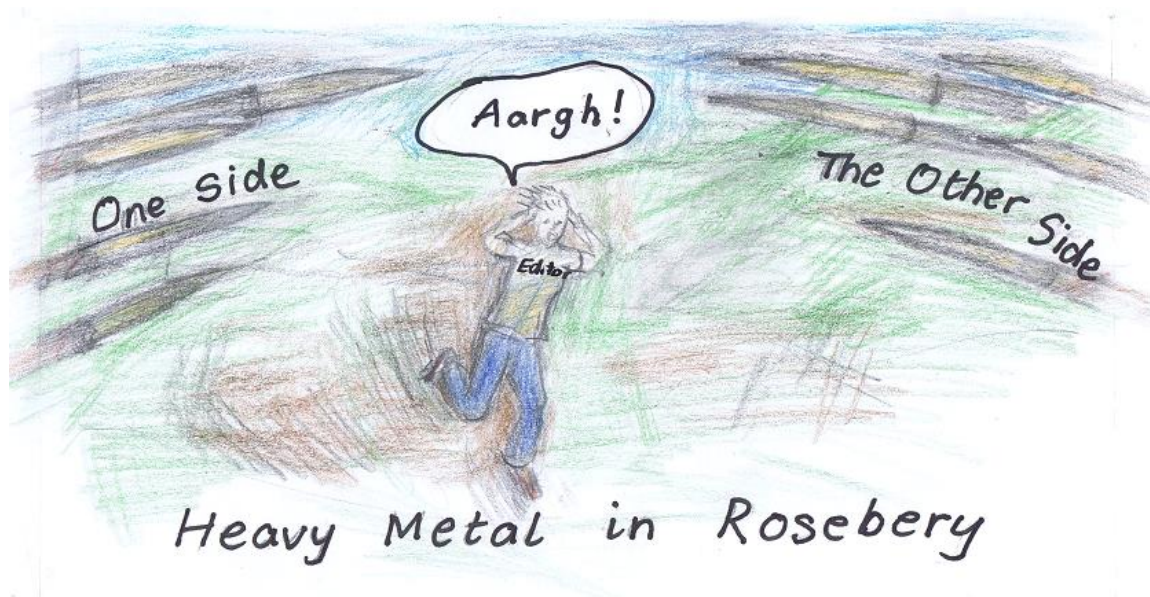
What about rainfall?

The annual rainfall of Rosebery is about 2186 mm. Sydney's is 1217 mm. But Rosebery is not the rainfall capital of Australia. (This title may belong to Tully, in Queensland.) But it is cool.

Oh dear – Rosebery's southern latitude (41 degrees, 46 minutes, 46 seconds), is almost exactly the same as the northern latitude where the Titanic struck the iceberg - 41 degrees, 46 minutes, seconds unknown.

(I did not go looking for this piece of information – I happen to be fascinated by the Titanic.)

Don't panic! Don't panic!



2. Introduction by the Guest Editor

By Dr Chrissie Pickin, Deputy Director of Public Health, Tasmania

This newsletter is the response of the Rosebery Community Reference Group to LEAD Action Newsletter vol 10, no.4, which was largely written by members of the Toxic Heavy Metals Taskforce Tasmania (THMTT).

It's about Rosebery, a small mining town on the west coast of beautiful Tasmania, Australia, and explores the Community Reference Group response to claims of heavy metal poisoning by a small group of residents. The previous newsletter vol 10, no 4 was very critical of that response but provided only one side of the story. I, as lead of the original project team exploring the small number of residents' claims, was offered and accepted the right of reply in newsletter no.11 which I took up (ref) but the broader Community Reference Group in Rosebery wanted their right of reply also. So we asked that we be afforded the same privileges as the Toxic Heavy Metals Taskforce- that of writing and guest editing a whole newsletter. The LEAD Group agreed to this, for which we are grateful.

The Community Reference Group includes local community members, the local council Mayor, the Australian Workers Union; the mine owners MMG; the local community health provider, the Public and Environmental Health Service and the Environmental Protection Authority- most of whom have written or contributed articles to this newsletter.

The interest we share with The LEAD Group and MMG and the community, is in a happy and healthy community in Rosebery. That is important to the mine owners as they need healthy and productive workers. Health is important to the local community, the unions and council obviously. It is important to the EPA, the health services and the Public & Environmental Health Service because it is our job- one we take seriously and believe in. We believe we have made much progress towards ensuring the health of the local community. There is further to go and we – the community, the unions, the mine and government are committed to working together to achieve it. This newsletter is testament to that.

We have not let the threat of legal action against some of the parties to the Community Reference Group stop us telling the other side of this fascinating story. The articles correct misinformation, explain how Rosebery community and stakeholders have responded to this and puts the situation in context- how Rosebery compares to other mining and non-mining towns in Australia and what an amazing place it is to visit. We raise a number of areas where improvement needs to happen nationally- notably the exposure levels of miners themselves. We believe that the LEAD Group could more usefully focus its attention on these areas rather than continually supporting a campaign group for which the evidence strongly refutes their claims.

I hope you enjoy the newsletter and that one day you come and visit our beautiful State and the West Coast town of Rosebery.

3. News

Lead isotopes in study of air pollution crossing the Pacific

Air samples from two sites in the San Francisco Bay area showed lead particles from Asia reach at least as far as the California coast. The numbers of particles were highest in spring.



“The lead levels measured in this study were low – in the nanogram range. Any health effects from this type of exposure to lead are not known. Still, the lead serves as an efficient marker to map global movement of pollution and shows a constant, yet varied, source of contaminants.

The use of lead “fingerprints” to measure overseas movement of pollutants improves on previous indirect and complicated methods. One third of the lead in the samplers was from Asia and this may indicate that other pollutants also cross the ocean. See [Wind whisks lead across the Pacific Ocean to California](#) [re: [Lead isotopes as an indicator of the Asian contribution to particulate air pollution in urban California](#)]

Visiting environmental expert warns of toxins

Professor Paul Ehrlich warns of the danger of man-made chemicals accumulating in the environment and in living tissue, including that of human. The rapid growth of less developed countries threatens improvements in western countries in reducing emissions of toxins, he said. At the same time, there are many toxic compounds in the environment released by western industry, and which will be around for a long time.

‘We don’t know nearly enough about most of them or how they might affect our health in the long term, especially mixed together. There may be surprises ahead that we won’t like,’ said Professor Ehrlich. See [Visiting environmental expert warns of toxins](#).

Germany sets new standards for blood lead levels

The policy paper by Wilhelm et al (2010), "[Reassessment of critical lead effects by the German Human Biomonitoring Commission results in suspension of the human biomonitoring values \(HBM I and HBM II\) for lead in blood of children and adults](#)", written on behalf of the Human Biomonitoring Commission of the German Federal Environment Agency, replaces health-based blood lead levels of concern / “goals” with individual action levels (called “reference values” in Germany) which differ for each sub-population, and are based on the 95th percentile blood lead result in a blood lead survey for that sub-population. Wilhelm et al state that,

Based on the results of the German Environmental Survey for Children 2003/2006 (GerES IV), the HBM Commission has updated the reference values for blood lead levels for the group of children (Schulz et al., 2009):

Children (3–14 years of age): 35 µg Pb/l blood. (3.5 µg/dL)

The reference values for adults (Schulz et al., 2007), which are based on data from the German Environmental Survey of 1998, are:

Men: 90 µg Pb/l blood. 9 µg/dL

Women: 70 µg Pb/l blood. 7 µg/dL

The LEAD Group produces national policy proposals for Australia’s National Health and Medical Research Council

In early December 2010, The LEAD Group web-published its [proposed policy for adoption by the NHMRC](#), together with a very [detailed background paper supporting the proposals](#). Research supporting lowering of acceptable blood lead levels around the world has also been recently web-published. There is now an overwhelming body of evidence on the dangers of a blood lead level above two and below 10 micrograms per deciliter – ie below the current NHMRC goal in Australia. Robert Taylor has revised our summaries of 35 research journal and medical news articles on both children and adults, and added new summaries for a total of [34 articles regarding unacceptable health effects at these “low” blood lead levels in children](#), and [15 articles on lead’s effects in adults](#).

‘An Entirely Preventable Disease’ - WHO issues booklet on Childhood Lead Poisoning

The World Health Organisation (WHO) has issued a 74 page booklet, [Childhood Lead Poisoning](#), which finds that prevention of lead poisoning is more cost-effective than vaccination. ‘Prevention is the best way to deal with lead poisoning,’ since, ‘for the most part, these effects [of lead poisoning] are permanent. They are irreversible and untreatable by modern medicine.’ ‘At lower levels of exposure [less than 5 ug/dL] that cause no obvious symptoms and that previously were considered safe, lead is now known to produce a spectrum of injury.’ As ‘there appears to be no threshold level below which lead causes no injury to the developing human brain’ WHO also declared in June 2010 that there is [no safe level of lead in food](#).

In other news from WHO, they advise that they are considering The LEAD Group’s proposal that WHO declare an “International Lead Poisoning Awareness Week”.

4. Letters to the Editor

From Crystal D. Owensby, M.S., CHES

Sent: Friday, September 24, 2010 12:45 AM

To: <The LEAD Group Inc>

Subject: Re: [Leadnet] Twenty Years of LEAD Campaigning - The LEAD Group 20 years on Elizabeth:



Although we have never met, I wanted to congratulate you on your efforts to prevent lead poisoning for the past 20 years. I always find your Leadnet posts insightful and they provide a global perspective of the importance of the work that I and our colleagues do each and every day. I have been working in the field of childhood lead poisoning prevention for the past 10 years. It is so multi-faceted and such a complicated issue to address.

It really takes many professional disciplines and community activists to create and sustain the substantial changes we both have witnessed.

Again, thank you for your posts and congratulations to Australia for having such a dedicated soul as yourself working to create healthier homes and communities!

Crystal

Crystal D. Owensby, M.S., CHES

Public Health Consultant, Health Education, New Jersey Dept. of Health and Senior Services, Div of Family Health Services, Child and Adolescent Health Program, Trenton, New Jersey

From Richard Rabin

Sent: Thursday, September 23, 2010 6:14 AM

To: <The LEAD Group Inc>

Subject: Re: [ABLES] Twenty Years of LEAD Campaigning - The LEAD Group 20 years on
Congratulations. Keep up the good work!



Rick Rabin

Lead Registry Coordinator, Massachusetts Division of Occupational Safety
Department of Labor (DOL)

[*Editor's note:* Richard Rabin has been the coordinator of the Occupational Lead Poisoning Registry at the Massachusetts Division of Occupational Safety since 1990. In that position he makes presentations on lead poisoning to physicians and workers and conducts workplace inspections. He also conducts indoor air quality investigations. Previously, he worked at the Boston Childhood Lead Poisoning Program as a grant writer, outreach worker and researcher. Richard has also produced the "Child Lead Poisoning and the Lead Industry" or "Sue Lead Industry" website at www.sueleadindustry.homestead.com - which documents lead paint litigation in the USA and the history of the lead pigment industry's knowledge about lead and its hazards.]

5. Visiting Rosebery and the West Coast of Tasmania

By Bronwyn Hill, Communications Consultant, in collaboration with Tourism Tasmania

Rosebery is nestled 145 metres above sea level in Tasmania's remote but celebrated West Coast.

Rosebery sits in a scenic valley, surrounded by rugged mountains and rainforest.

Tom McDonald discovered gold in 1893 and a village was soon built at the base of Mount Black. McDonald named the village after Lord Rosebery, the Prime Minister of England at the time.

The town is home to around 1,300 people, and plays host to many others, keen to enjoy the unique experience Tasmania's West Coast Wilderness has to offer.



Montezuma Falls. Photo: Geoff Murray, Tourism Tasmania

Like the other inland populations centres of Queenstown, Zeehan and Tullah, Rosebery is close to magnificent lakes, rivers, rainforests, dunes and historic sites.

One of the region's top attractions is Montezuma Falls – at 104 metres, one of Tasmania's highest waterfalls.

The three-hour round trip walk to Montezuma Falls begins just ten minutes south of Rosebery and is regarded as one of the easiest and most rewarding walks on the West Coast, taking tourists through open and park-like rainforest, along the route of the historic North East Dundas Tramway, right to the base of the falls.

Along the way, tourists can enjoy beautiful flora including leatherwood, myrtle, sassafras, giant tree ferns and eye-catching fungi, and may also catch sight of native wildlife, including several species of birds.

The walk allows both young and old to take in the beauty and serenity at their own pace, but for those looking for a more comfortable journey, the falls can also be accessed by FWD and coach tours.

Bushwalkers keen to see more of the area can climb Mount Read, which offers superb views over Rosebery and, on a clear day, it's possible to see as far as Macquarie Harbour to the south.

For those hoping for a more challenging but equally visual trek, Mount Murchison and Mount Farrell offer fantastic views, albeit after a more strenuous walk.

While there's no shortage of scenic walks in the area, there are many other activities on offer.

Keen fishers can head to Lake Pieman, a Hydro Tasmania lake, which lies to the west of Rosebery, and is stocked with plump trout.

It includes a number of boat ramps for those wanting to spend the day fishing, while others can enjoy a picnic or barbecue on the shore.

Cruises departing from the township of Corinna also allow visitors to explore the Pieman River from the shore.

Lake Rosebery is another noted fishing spot.

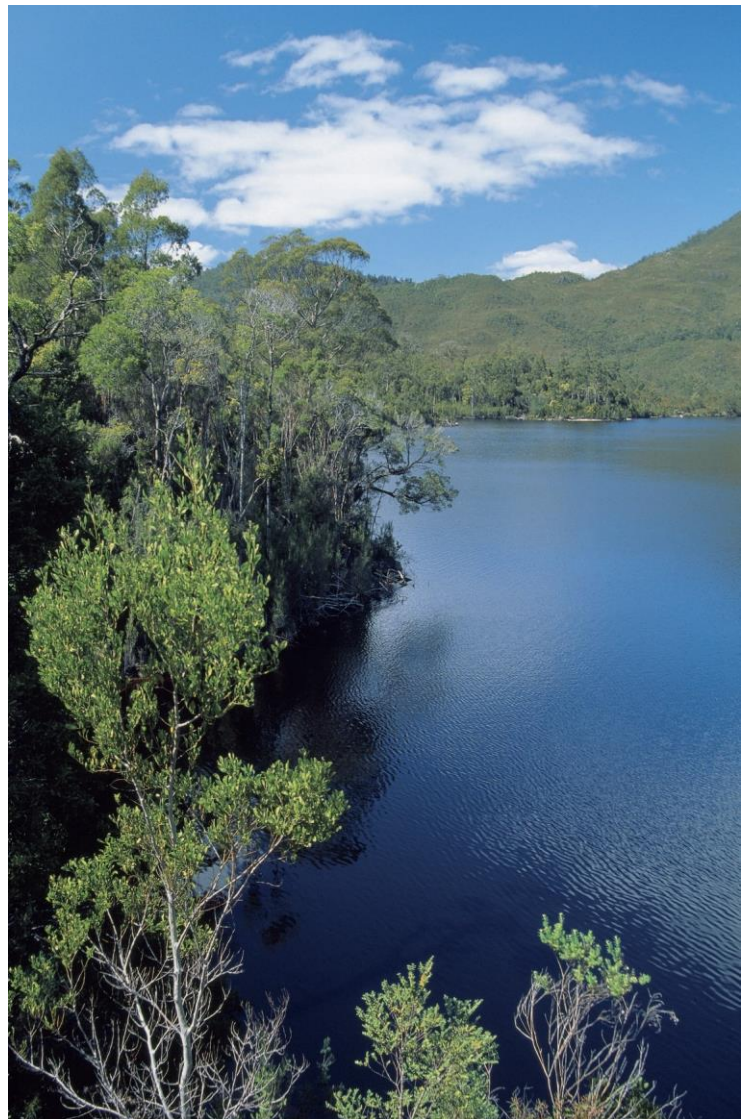
Rosebery has a range of accommodations, catering to all tastes, from camping to quality motels, hotels and guest houses. Visitors can enjoy a meal or a snack at a local cafe or pub.

Slightly further afield are some of the most spectacular attractions Tasmania has to offer.

The picturesque coastal town of Strahan, situated in beautiful Macquarie Harbour, provides a great base for exploring this stunning region.

The major port during the West Coast's booming mining days, Strahan is now recognised for its thriving tourism and aquaculture industry.

From there, visitors can discover the convict history of Sarah Island, the magnificent King River, the world famous world heritage Gordon River cruise, which takes in the ancient rainforest and Tasmania's famous fish farms, and Ocean Beach, which at more than 30 kilometres, is the longest beach in Tasmania.



Lake Rosebery. Photo: Joe Shemesh, Tourism Tasmania

Tourists can also take plane or helicopter sightseeing tours over the World Heritage Wilderness area, enjoy the charming shack sites of Granville Harbour and Trial Harbour, take a guided bike tour on the Henty Dunes, or explore the region at their leisure, on foot or by car or FWD.

A major highlight of the region is the West Coast Wilderness Railway. This original steam railway, from Strahan to the inland mining town of Queenstown, has been restored, allowing visitors to take a trip back in time, and discover Tasmania's rail heritage.

The 35 kilometre journey winds through dense rainforest, steep gorges and across towering bridges, providing the most spectacular views of the rivers below.

Queenstown itself is another popular tourist destination.

The largest town on Tasmania's West Coast, Queenstown is renowned for its mining history. It also has a number of wilderness walks in the area, along with great trout fishing in several surrounding lakes.

The other inland population centres of Zeehan and Tullah, and the small historic townships of Gormanston and Linda are also within a short distance from magnificent lakes, rivers, rainforests, dunes and historic sites.

With its clean air, mild climate, and numerous attractions, Tasmania's West Coast is a major drawcard for the state, offering visitors a unique and memorable experience.

The following sources were researched to write this article:

www.westcoast.tas.gov.au

www.parks.tas.gov.au

www.westernwilderness.com.au

www.puretasmania.com.au

6. Rosebery's Mine

By Bronwyn Hill, Communications Consultant, in collaboration with John Powell, Engagement Manager, MMG

The Rosebery mine is a polymetallic underground mine, in operation since 1936, and with the current potential to extend its life beyond 2020.

The mine employs 275 people and is owned by Minerals and Metals Group (MMG), the Australian arm of China Minmetals Corporation, which took over operations from the debt-ridden Oz Minerals Ltd in June, 2009.

With that, MMG also took on the damaging allegations that Rosebery's residents and their pets were being poisoned by heavy metals from the mine.

The company has since committed significant resources, both human and financial, to help establish the facts and provide some clarity and certainty.

MMG General Manager, John Lamb, says this is an indication of the company's ongoing and long-term commitment to Rosebery, consistent with the importance MMG places on the need to apply good science to the monitoring and reporting of results.

"The Rosebery mine has been operating for almost 75 years and we hope to be here for decades to come", Mr Lamb said.



Rosebery Mine and Township

“Our long-term plan to operate this mine only works if people are happy to come and live in the town and work at our Rosebery site, so responding to the concerns about potential heavy metal contamination was a necessity.

“Over the past eight months, MMG has completed one of the largest community environmental testing programs undertaken in Australia, with in excess of 2,000 samples – over 35,000 analytical results – and more than 420 bio-monitoring tests”, Mr Lamb said.

“The results of those tests backed up other independent investigations, which showed no widespread health risk from heavy metals in Rosebery.

MMG says the mine’s workforce has been supportive of the company’s efforts, and says this was underscored by the overwhelming support for the company’s workforce bio-monitoring program.

The Australian Workers’ Union covers workers at the mine, and says while that’s true; it would prefer a greater access to these workers at their tasks.

“For my liking, they still don’t quite understand what good and continuing consultation, (and constructive scepticism), is all about”, said the AWU National Occupational Health and Safety Co-ordinator, Yossi Berger.

“I’d like to see much more accurate and inclusive consultation with the union, (as a knowledgeable representative of the workers), on occupational health and safety”, Dr Berger said.

The workers themselves are tested on a regular basis, as per the standards in place, e.g. every six months for those staff working in the concentrator and, for all other employees, every 12 months.

The National Health and Medical Research Council (NHMRC) has identified a target health lead level of 10µg/dL for the general community, although a higher reference range is allowed in an occupational setting.

“In the program we have conducted, there was no exceedence of occupational or community action or reference ranges for any of the metals, and importantly, no child that we tested had a blood lead level which exceeded 5µg/dL”, Mr Lamb said.

Dr Berger says it’s true that monitoring levels at the moment are surprisingly low, but says in his view, any blood level of lead is a concern, even if within currently suggested exposure standards.

“More than 50 percent of all ‘safe’ exposure levels for significant industrial chemicals have been shown to be wrong over the years, and at times by orders of magnitudes”, Dr Berger said.

“But industry and regulators don’t effectively understand that the lessons of history are also objective facts; note the tragic history of all forms of asbestos, organochlorines, or the more current issues with organophosphates or endosulfan”, he said.

MMG says it will continue to be guided by the NHMRC on this issue, but believes it should strive to always improve the results.

“Therefore, our objective will continue to be to utilise operational, health and hygiene programs, designed to lower lead levels”, Mr Lamb said.

To that end, the company plans to continue to improve operational methods to reduce exposure; e.g. via the installation of dust curtains and washing facilities at the train loading station; an equipment upgrade at the filter plant; and increased air monitoring activities.

The EPA says these improvements should result in less dust leaving the site and the EPA will incorporate the additional air monitoring requirements into the operational conditions for the mine.

There is also an on-site laundry to wash all work clothes, and all workers are engaged in health and hygiene programs to reduce potential exposure.

MMG says the residents of Rosebery can take significant comfort from the work conducted and the conclusions reached by the company and the DHHS, that there is no evidence of harm to human health from the presence of heavy metals in the town.

But the company has vowed to continue to work with the community to see the issue through to the end.

“We will work with the EPA on our air monitoring regime, and will continue to offer blood tests free of charge to any community member”, Mr Lamb said.

“Most importantly, we will work with the DHHS and the West Coast Council, to ensure that residents know what precautions to take living in a mining town, and we will maintain and improve our community and awareness programs on this issue.

“We are very confident in the results of our extensive work and believe that this view is shared by the overwhelming majority of Rosebery residents.

“We are focussed now on working with the community to rebuild its reputation as a wonderful place to live and raise a family”, Mr Lamb said.

7. Seventy-five Years of Mining in Rosebery

By John Powell, Engagement Manager, MMG

The Rosebery ore body was discovered in November, 1893, by Tom McDonald. Various attempts were made over the following years to bring the mine into commercial operation. But it wasn't until February, 1936, that full production began, with the commencement of concentrator operations and the transport of metal concentrates to the Port of Burnie, via the Emu Bay Railway.

The mine and mill have been in continuous operation since that time, and are considered vital to the economic success of the town.

The Rosebery mine has a very close association with the community, both physically and socially. For almost 75 years, there has been a symbiotic relationship between the mine, its staff and the community...and that continues today.

The mine has, in the past, provided sporting facilities, playgrounds, halls and other facilities. They remain in use in the township. Today the focus is on health, education, business development and community “events”.

The current owner, MMG, financially supports the Community Health Centre; the Rosebery Festival (an annual event held each February); the Rosebery Heritage Centre; arts and craft activities; and local sporting clubs, including sponsorship of the Rosebery Athletics Carnival, the Tullah Challenge, and major sponsorship of the local Rosebery Toorak Football Club.



The company also provides assistance for employees' children for further education; two scholarships for West Coast children at the Tasmanian Academy's Hellyer Campus in Burnie; sponsors the Tasmanian Ballet & Community Outreach Program for West Coast Schools, along with the Men's Health Forum and Women's Health Day held on the West Coast; and participates in and sponsors the West Coast All Schools Tree Day. There are many other organisations which also benefit from contributions from MMG.

On the education front, MMG provides fruit and hand wipes to each of the schools in the region, to encourage health and hygiene within the community. A bonus activity occurred in August when MMG sponsored the

schools in an Eat Well Tasmania healthy menu competition.

With the support of a chef from Melbourne, 13 children aged between seven and 15 prepared and cooked a four-course menu which they then served to community leaders including the West Coast Mayor, Darryl Gerrity; the two school principals Alex Downes and Peter McBain; and the MMG General Manager John Lamb.

From a broader community aspect, John Lamb provides “State of the Nation” addresses to the community every three months and MMG will soon open a ‘shopfront’ in the Main Street. This will be managed by MMG Rosebery Stakeholder Relations Officer, Christine Winskill, and will offer the community immediate and easy access to information on all of MMG’s operations and activities.



‘Eat Well Tasmania’ contestants

The broad management team within the mine operations has also formed a One Rosebery Leadership Team which raises funds for community developments and participates in regular activities within the township, e.g. refurbishing bus shelters etc.

As the mine approaches its 75th anniversary in February next year, MMG plans to mark the occasion with official celebrations, designed to include the entire Rosebery community. Activities planned for the anniversary include an official reception, to be attended by Federal and State politicians, officials from

China Minmetals Corporation (the Shanghai-based owner of MMG), senior management of MMG, local identities and other industry representatives.

An open day is also planned at the mine site for members of the public, on Saturday, February 19, in conjunction with the Annual Rosebery Festival.

The Festival activities, running over both Saturday and Sunday, will include:

- An MMG Open Day (Saturday);
- An Art Exhibition;
- A poetry/short story competition;
- An MMG-sponsored Festival parade in the Main Street (evening);
- An amusements area and food plaza;
- Musical entertainment; and
- A health promotion marquee (DHHS & MMG).

The event is regarded as an important occasion for the community, the region, past and present mine employees, as well as tourists, and all have been invited to attend and support the festivities.

8. Response from the Mayor

By Darryl Gerrity, West Coast Mayor

As a Strahan councillor and now as a West Coast councillor, I have always been sympathetic to pollution or heavy metal claims and have always insisted that they be investigated by the proper, competent and qualified authorities.

This has always been the case, as with the previous Mount Lyell pollution issue and the Gormanston lead poisoning issue. I have insisted on my actions being guided by the relevant community issues, science and findings. My actions following these two cases involved family or personal expense.

My actions in the Rosebery heavy metals issue are no exception.

When I first became aware of the Rosebery issues, I met with the complainants, visited the sites, made fellow councillors aware, and notified the authorities. I also put a motion to the West Coast Council which resulted in a Rosebery Reference Group being set up, which I chair.

At this point in time, many tests have been conducted by the council, the mine and government departments, and advice has been given by independent specialists to the Reference Group. While a technical sub-committee still has to report back to the Reference Group, there is no substantive evidence at present of heavy metal poisoning of Rosebery residents.

There is some evidence of lead in some soil samples, as would be expected in a highly mineralised area such as Rosebery and generally throughout the West Coast. But if proper hygiene principles are followed there should be no detriment to our health. It is a given that the complainants may be ill, but at present there appears to be no evidence to link their illnesses to heavy metal poisoning. As many residents and children have been tested, with no overall health alarm given, except for proper hygiene principles, I am convinced that everything is being done to determine if Rosebery is a health risk. At the time of writing, tests have shown that Rosebery is a safe place to live and work.

It is unfortunate that some scare tactics, claims and personal insults have resulted in economic and social damage to a community that deserves much better. Poor, unbalanced and badly researched journalism has also contributed to the tarnishing of Rosebery's image.

My hope is that the technical sub-committee results will be positive and that we can then start re-building Rosebery's morale. I also hope that the affected residents will seek proper medical help for their ailments and we can get on with our respective lives and industries.

In conclusion, I applaud the Rosebery Mine's and the State Government's commitment to resolving this issue and its quick response to the concerns of the affected people. I also applaud the Rosebery community's response, and the residents' willingness to address issues and be tested for heavy metal poisoning.

I applaud the Rosebery community's resilience on this issue. The health and wealth of West Coast residents and industries is my prime concern.

9. How does Rosebery compare with other Australian mining towns?

By Rosalind Harrison, Toxicologist, DHHS, Tasmania

The allegations of heavy metal poisoning in Rosebery have focussed attention on the effects of mining on the wider community, not just in the Tasmanian town, but across the nation.

Tasmanian health authorities say while there is no acknowledged safe level of lead, the aim is to reduce exposure and absorption to an absolute minimum for everyone. But, they maintain that in reality, many Australian mining areas would strive to have the levels of community results recorded in Rosebery.

Mining activities can result in the production of mine tailings waste and airborne releases of metals – both of which represent a source of exposure to the non-mining community. In addition, occupationally exposed workers can inadvertently contaminate the home environment, resulting in potential exposure to family members (Chiaradia et al 1997).

Lead is a widespread naturally occurring metal. It can be found in increased concentrations in some areas through natural mineralisation. Other environmental sources include lead mining and smelting, and activities such as the breaking down of lead batteries for recycling. Young children are particularly susceptible to the effects of metals for two main reasons. Firstly, they are more likely to eat or chew on non-food objects e.g. soil, and frequently suck their hands and fingers. Secondly, children have a higher absorption rate of metals from the gastrointestinal tract (Meza-Figueroa et al 2009). It is generally accepted that measuring the concentration of lead in blood is the best indicator of exposure to lead (NHMRC 2009). The blood lead level is reported as micrograms (µg) of lead per decilitre (dL) of blood (µg/dL). Preventive measures can then be taken to reduce or remove exposures to individuals with high blood lead levels. Based on the scientific evidence on the effects of low-level exposure to lead, it is not possible to make a definitive statement on what constitutes a 'safe level' for blood lead concentrations. This is the view of the National Health and Medical Research Council (NHMRC) as well as other international organisations. The NHMRC recommends that all Australians should have a blood lead level below 10 µg/dL (NHMRC 2009).

Mining in Australia dates back to European settlement at the end of the 18th Century, with the discovery of coal in NSW (ABS 2001). Lead was the first metal mined in Australia – in 1841 at Glen Osmond near Adelaide.

The world famous gold rushes of the 1850s resulted in people migrating to Australia. During the gold rushes, Australia was producing almost 40% of the world's gold (ABS 2001, Mining History 2010, Australian Mine Atlas 2010).

In the early years of the 20th Century, mining activity in Australia began to decline. The next discovery was the lead, zinc and silver deposit at Mount Isa, where mining and smelting commenced in 1931. From the late 1940s, mining in Australia began to expand, with the discovery of mineral resources and the investment of overseas mining companies (ABS 2001, Mining History 2010, Australian Mine Atlas 2010).

Today, the minerals industry is a major contributor to Australia's export trade. A wide variety of minerals are extracted across all states and territories, including bauxite,

aluminium, diamond, lead, ilmenite, rutile, zircon, coal, zinc, gold, iron ore, manganese, nickel, copper, silver, uranium, and opal (Australian Mine Atlas 2010).

Major mining towns in Australia today include Mount Isa (Qld), Broken Hill (NSW), Port Pirie (SA), Coober Pedy (SA) and Kalgoorlie (WA).

The mine at Rosebery is operated by Minerals and Metals Group (MMG). It is an underground mine with 243 employees, and has been in continuous operation since 1936. The mine produces approximately 700,000 tonnes of ore per year through mechanised underground mining methods. The ore is processed into concentrates of zinc, lead and copper. Silver and gold are also extracted from the ore (MMG 2010). Extensive biomonitoring tests were carried out on Rosebery residents and mine workers during the period 1st January, 2008 to the end of April, 2010. 504 adults (392 men and 112 women) and 29 children from Rosebery were tested for lead exposure. The majority of this testing related to the occupational testing of miners. The average level for adults was 7.5 µg/dL, and women specifically had an average level of 2.9 µg/dL. The range of blood lead levels for adults was 1 µg/dL to 30 µg/dL. 116 adults had blood leads, at least at one point in time, over 10 µg/dL, but 111 of these were known to be occupationally exposed. The average level for children was 3.0 µg/dL. This level included the results of two children whose property was contaminated following a concentrate spill. Excluding the average of these two results, the average is reduced to 2.6 µg/dL (compared with 7.04 µg/dL in 1998).

In comparison, blood lead levels in other Australian mining communities are more often elevated, particularly in children. The table below summarises mean blood lead levels for children across Australia from both mining and non-mining communities. Further detail of monitoring surveys carried out across Australia is provided in the text.

Table 1: Comparison of mean blood lead levels (µg/dL) for children from mining and non-mining communities across Australia over the past 26 years

	Rosebery (Tas)¹	Mt Isa (Qld)¹	Broken Hill (NSW)	Port Pirie (SA)¹	Fremantle (WA)²	Sydney (NSW) ²	Derby (WA)²
1984				22.4			
1997							4.5
1998				10.4			5.0
1999							5.1
2001			7.6	9.8			
2001- 2005						3.1	
2003			7.1				
2004				10.6			
2005					1.83		
2006- 2007		5					

	Rosebery (Tas)¹	Mt Isa (Qld)¹	Broken Hill (NSW)	Port Pirie (SA)¹	Fremantle (WA)²	Sydney (NSW) ²	Derby (WA)²
2007			5.8				
2008- 2010	3.0						
2010		4.27 ³					

¹ Mining community

² Non-mining community

³ Preliminary unpublished result for 2010

Data only summarised here, fully reported and referenced in the text of the article.

Mount Isa in Queensland is one of Australia's largest mining and smelting operations, producing lead, silver, copper and zinc. In 2006, Xstrata Mount Isa Mines commissioned the Lead Pathways Study, to better understand the potential pathways of lead into the Mount Isa community through land, air and water. In July, 2009, phase one (land) of the study was completed; concluding that the risk to human health from historical mine sediment is low. Phases two and three (air and water pathways) are due to be completed in 2011 (The University of Queensland 2009, Xstrata 2008). Queensland Health reported that a survey of 400 Mount Isa children aged between 12 and 60 months (approximately 25% of the age cohort in the Mount Isa community) in 2006-07 showed a mean blood lead level of 5 µg/dL, with 11.3% (45 children) having levels greater than 10 µg/dL and 0.5% (two children) exceeding 20 µg/dL. The highest recorded blood lead level was 31.5 µg/dL (Queensland Health 2008). Preliminary results are available from a repeat survey undertaken in 2010 of 167 Mount Isa children. The mean blood lead level was 4.27 µg/dL, with 4.8% (eight children) equal to or above 10 µg/dL and 0.6% (one child) exceeding 20 µg/dL. The highest recorded blood lead level was 22.4 µg/dL (unpublished data, personal communication from Dr GR Neville, Senior Medical Officer, Queensland Health).

In Broken Hill, silver, lead and zinc are mined. In the early 1990s, high blood lead levels (means of 12-16 µg/dL) were confirmed in children aged between one and four years. In 1994, the Lead Management Program was launched to reduce blood lead levels in children. In 2001, the mean blood lead level for children had decreased to 7.6 µg/dL with 64% of children below 10 µg/dL. However, 15% of children still showed significantly elevated blood lead levels (>15 µg/dL) (Burke et al 2003). By 2003, the mean child blood lead level had further reduced to 7.1 µg/dL, with 12% showing elevated blood lead levels (>15µg/dL) (Lyle et al 2006). By 2007, the mean blood lead level had dropped to 5.8 µg/dL; however, one in five children still have blood lead levels higher than 10 µg/dL (Boreland et al 2008, Boreland and Lyle 2009).

The Cockle Creek smelter in Boolaroo was a zinc and lead smelter prior to its closure in 2003. In 1991, lead emissions were controlled and subsequently, child blood lead levels decreased from 11 µg/dL (1991) to 7.5 µg/dL (2000) (Morrison 2003). Since the smelter was closed in 2003, blood lead levels have decreased substantially (Boreland et al 2008).

The Port Pirie lead smelter in South Australia processes lead and zinc ore. Since the early 1980s, high blood lead levels have been a concern in the local community and in 1984, the Port Pirie Lead Implementation Program was established to reduce the blood lead levels of children. In 1984, the mean blood lead level of children aged one to four years in Port Pirie

was 22.4 µg/dL with 98% of children exceeding 10 µg/dL. By 2004, monitoring results significantly improved, with a mean blood lead level of 10.6 µg/dL and 60% of children exceeding 10 µg/dL being reported (Maynard et al 2006). During the years 1998-2004, the downward trend reached a plateau with mean blood lead levels and the proportion of children exceeding 10 µg/dL reported to be: 10.4 µg/dL and 59% (1998), 9.8 µg/dL and 55% (2001), and 10.6 µg/dL and 60% (2004), respectively. The Lead Implementation Program not only identified and case managed young children with elevated blood lead levels, but also involved house decontamination, treatment of institutions frequented by young children, soil treatment, city greening, footpath sealing, family education and support, and community education (Maynard et al 2006).

Since 2006, the Department of Health (South Australia) reports the proportion of Port Pirie children (zero to four years) with blood lead levels below 10 µg/dL. Results for 2009 indicate that 72% of the children tested in Port Pirie had a blood lead level below 10 µg/dL – this is an improvement of approximately 23% since 2005 (Government of South Australia 2010a). Interim results for the first half of 2010 indicate that so far this year, 65.7% of children tested had a blood lead level below 10 µg/dL (Government of South Australia 2010b).

In non-mining communities across Australia and around the world, current blood lead levels are similar to those observed in Rosebery. Comparisons of mean blood lead levels in Australian children (less than six years) from urban environments demonstrate levels of 1.83 µg/dL (Fremantle; Guttinger et al 2008); 3.1 µg/dL (Sydney; Gulson et al 2006); and 4.5-5.1 µg/dL (Derby, WA; Mak et al 2003). Similar mean blood lead levels have been observed in children (less than 14 years) around the world: 3.1 µg/dL (Czech Republic; Batariova et al 2006); 1.63 µg/dL (Germany; Kolossa-Gehring et al 2007); and 1.83 µg/dL (Sweden; Stromberg et al 2008).

Rosebery is in a very different situation from other prominent mining communities in Australia, involved with lead production. The Rosebery mine does not have an active smelter producing lead in emissions into the air (which in turn can find its way into surrounding household environments), and does not face quite the same challenges in maintaining low blood lead levels in children. The issue in Rosebery is basically one of a legacy of mild to moderately raised lead levels in soil. Some of this is related to the natural mineralised geology of the region, and in some places there may also be residues from waste ore being used as top fill. Another very important source can also be lead in paint in older housing, and studies on the West Coast have also shown the importance of household hobbies such as car repairs and making fishing sinkers. Good dust management at the mine, hygiene at home, and grass/paving cover of bare dirt will minimise any inhalation exposure to lead.

The crucial issue resulting from the Rosebery investigations is that despite there being evidence of lead contamination in the soil, there is a very low health risk because the blood test results show that little lead is entering the body or being taken up. There is certainly a potential lead hazard in Rosebery, but lead in soil can only cause harm if it gets into the body and is absorbed at a level which causes damage to organs, and this is just not being observed.

However, health authorities say while there are still some people in the at-risk group above 5 µg/dL (one child and seven women of childbearing age), they are not content to leave the issue without further attention, and will strive to reduce the individual and average levels even further.

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10. Rosebery Community Response

By Bronwyn Hill, Communications Consultant, in collaboration with local resident, Jo Powell

Much of the publicity surrounding Rosebery has focussed on the allegations by the Toxic Heavy Metals Taskforce.

But, for the majority of residents, there is frustration and anger over what they see as a lack of balance in media reporting of the Taskforce's concerns, and the ongoing effect on the town's reputation and financial prospects.

One local, Jo Powell, became so frustrated that the majority view was not being heard, that she set up the Facebook group "Rosebery is NOT Contaminated. I'm Prepared to be Tested", to put the other side of the story.

The Facebook group has attracted 484 members, and Ms Powell says while some are also members of the Toxic Heavy Metals Taskforce, most believe there is no danger.

"I can't speak for every member of the group", Ms Powell said.

"But, excluding those who are members of the Toxic Heavy Metals Taskforce, most of the Facebook group members joined up with the same basic opinion; that there may be no contamination danger in Rosebery, but let's have some testing done and find out for sure and do something about it if there is.

The community still feels that the majority view isn't being heard", she said.

"The press only seems interested in hearing the stories of the THMTF, and when community members have been interviewed, their stories have been edited so that the actual comment has an entirely different context.



Jo Powell, and her daughter Kirsten

"If we respond to allegations or accusations on websites, we are abused and insulted", Ms Powell said.

Ms Powell said her main concern is how the community as a whole has been affected; in particular, a fall in real estate prices and the number of tourists visiting the town.

"People think our drinking water is toxic, people have been abused and spat on in the streets, and most tourists who come through town know the story and community members have said they feel as though they have been judged by strangers and have been found lacking", Ms Powell said.

The residents of the town mostly rely on the mine for their income but the business owners rely on the tourist trade, and already this year, tourism is down on what it was last year.

"Some are understandably angry about the loss of income etc, and with the test results making it clear that there is no danger, they feel justified in supporting their town and want to move on", she said.

Ms Powell said whilst illnesses obviously do occur in Rosebery, there doesn't appear to be a large number of people with unexplained or unusual illnesses.

"I don't know everyone's medical history personally, but I do know 98 percent of townspeople and am friendly enough with them that I would be told if there were concerns", Ms Powell said.

"I do have two friends who were diagnosed as having heavy metals poisoning but they've since received a different diagnosis by another doctor", she said.

Ms Powell also believes Rosebery's pets are safe, citing anecdotal evidence from people living in the town.

"I personally have four cats and one dog, and all of them spend quite a bit of their time outside, and are very healthy", she said.

Ms Powell said the same applies to all of her friends with domestic animals, and friends of friends have also reported no problems with their pets.

Whilst the Tasmanian Department of Health and Human Services has faced numerous criticisms from the Toxic Heavy Metals Taskforce, Ms Powell has only praise for the Department's response to the allegations.

"I feel the criticisms are at times conflicting and have no grounds, and I am very happy with the Health Department's response", she said.

"As far as I can see, they followed protocol and took appropriate steps to determine the risk in Rosebery, and they have always offered assistance where they possibly could and have been professional throughout.

"Members of the Taskforce have made these criticisms but have made very little real effort to aid the investigation, which I would have considered to be one of their most important priorities", she said.

The response of the Rosebery mine's owner MMG, has also drawn high praise.

"I, and the community, couldn't be happier with MMG's response", Ms Powell said.

"They have gone above and beyond what was required of them and spent quite a considerable amount of money to do so, even though the issue and their responsibility for it were still uncertain when they started looking for solution.

Ms Powell and her supporters have vowed to continue working to improve tourist numbers and house prices, and most importantly, to help restore Rosebery's reputation.

"I think that is what has hurt us most of all", she said.

"We are a very close community, who care for each other and support each other.

"This issue has resulted in us being labelled hillbillies in denial, and people think of us as backwards and uncaring because we don't support the claims made by the Toxic Heavy Metals Taskforce.

"This isn't the case at all".

11. Guardians of safety?

By Yossi Berger, Director of the Australian Workers' Union's Occupational Health and Safety Unit

The Australian Workers' Union became involved the Rosebery matter in the same way it has in other divisive issues affecting both workers and the wider community.

Health and safety concerns for a union generally start with risks to workers at work.

We are extra cautious when chemicals are involved because we are well aware that over the years, many exposure standards which were once considered safe for an 8 hour day, 5 days a week, over 40 years of work life, have too often been demonstrated to be wrong - in many cases wrong by orders of magnitude. Benzene and beryllium are two examples.

After work, workers usually simply become citizens in the local community in which they and their families live. The AWU therefore takes an interest in H&S issues within such a community which may be related to the workplace in question. When unease is expressed by workers, their families and/or members of that community we take special note.

It's usually not an easy matter to establish any chemical effects on people or the lack of any such effects. Simply using a benchmark for safety – such as an exposure standard – should always be regarded only as a starting point. What is the minimum achievable and why can't that be achieved? History shows that any presumably 'safe' levels are likely not to be regarded as such in a decade or two.

When people in a community report what they regard as ill affects as a result of what they believe is exposure to various chemicals, too often a predictable pattern of events is generated. It often then flows back into the workplace and can seriously distress a number of workers who may be working with such chemicals. A form of local social distress can be created. Levels of anxiety and fear about health may take on inappropriate and irrational proportions. Which is not to say that the original sense of harm was wrong, or that the original anxiety about possible health effects was wrong or that the range of difficult questions asked by such people or community groups is inappropriate. It usually is *appropriate* and can become an effective socio-occupational agent for change, such as the AWU achieved in Australia with synthetic mineral fibres (fibreglass, rockwool, and ceramic fibres), and the very dangerous pesticide, parathion.

When the social mechanisms that such people turn to for help, such as local councils, clinics, government departments such as health and environment, don't understand that initially the anxiety is the issue, the perception of harm, and resort too quickly to the tenuous guardians of reason, such as exposure standards, accepted 'safe' levels in blood or urine, 'stay safe' techniques "such as wash your hands more frequently", they tend to increase the anxiety rather than deal with it.

When that happens and those who see themselves as victims feel abandoned by 'the system' they tend to shop for alternative advice because they remain anxious and their illness becomes more worrying. I quickly add here that I'm not dismissing the obvious observation that such people may very well be ill in a number of ways directly related to exposure to certain chemicals. I'm establishing the community context in which the AWU may find itself. Since the questions asked about chemical risk are difficult to easily resolve that creates levels of uncertainty that feed directly into 'it's the chemicals that are making me sick, can you prove otherwise?!'

In such circumstances I try to bring all the relevant people together and begin by stating that those people who say they are affected by any chemicals must be regarded as being so affected. Then, from that starting position (from that hypothesis), any experts and scientists ought to be able to provide reasonable evidence and argument why this is not the case. Their task is to show that the 'culprit' chemicals are not the likely cause of any illness. If they cannot do that then the proposition must stand, i.e. they are so affected.

I try to involve all the relevant government departments, all the community groups, the workplace and workers. It's of great importance to involve those people who report ill effects – without their involvement, the issue will never be resolved in a humane manner. The main things that the affected people can bring to the discussion is their suspicions and the tools and means they prefer used in tackling those suspicions. That is, they may regard certain departments as biased, they may regard certain experts and scientists as partisan or not knowledgeable enough, they may regard any company information as self serving, and regard with high suspicion any consultants used by the company. All of this must be brought out in the open, discussed and dealt with in a fair manner.

In all these circumstances, it's important not to make the mistake that the primary issue is the 'true' perceptions of those who see themselves as victims. It's trite to say that the perceptions are true (veridical*) but the chemicals aren't the main issue. The chemicals *are* the main issue, but related anxiety has emerged as the vehicle with which to deal with all these matters. If this tone is not taken and the perceptions are obviously treated as the main issue the affected people will become insulted and feel demeaned; the issue will escalate.

* veridical

- coinciding with reality; "perceptual error...has a surprising resemblance to veridical perception"- F.A.Olafson wordnetweb.princeton.edu/perl/webwn
- True; Pertaining to an experience, perception, or interpretation that accurately represents reality; as opposed to unsubstantiated, illusory, or delusory en.wiktionary.org/wiki/veridical

In Rosebery, we observed at early community meetings that a lot of bitterness in the community had already emerged. Luckily the company was helpful as were the two government departments involved. So was the region's local council. We did not succeed to involve the group representing some of the affected people, and to that extent the process is still not resolved. The department which was regarded as unhelpful by some of the affected people has, in fact, worked very hard behind the scenes to resolve these issues, as it still is. People within it continued to extend themselves to address the full range of issues involved. Not at any stage did I detect the slightest disrespect towards any of the people involved.

Nevertheless, I found that there was a touch too much confidence in standard, scientific rationality and standard research logic. The AWU remains concerned about any exposure to the heavy metals and we are closely interacting with workers to keep a watching brief on working practices. Just in passing, I believe that exposure levels to lead are still too high and that very careful neuropsychological testing regimens – in many workplaces around the country – would in fact indicate that early, 'pre-clinical' signs of effect already exist, even at the currently presumed 'safe' levels.

12. Union concerns about Rosebery heavy metals

Interview with Dr Yossi Berger, Director of the Australian Workers Union's National Occupational Health and Safety Unit

By Dr Chrissie Pickin, Deputy Director, Tasmanian Department of Health and Human Services

Dr Berger: does the AWU have concerns about lead and other metal levels in Rosebery?

“Yes. In four ways:

First, exactly what are any related occupational risks, currently and prospectively?

Second, the geographic area is highly mineralised; what implications does that have to any matters of possible exposure?

Third, are there - or were there historically - any levels of release from the mine (or any mines) and its processes (or works) that may increase risk?

Fourth, in which ways – if any – may the above matters affect people in the community?

However, to date, by far, most measurements and monitoring we've seen have not set off any alarms. Though there are a number of contamination-related matters, we're keeping a watching brief on, e.g. some tank water contamination, some residential 'hot spots'.”

The allegations of heavy metal poisoning of Rosebery residents have received widespread exposure and caused some alarm. Does the union have a position on those allegations?

“Our position is that all such comments must be treated with dignity and respect. The relevant questions must be openly asked and discussed, and the people reporting ill effects and anxiety given many opportunities to express their views. They should be helped to say their piece and present any evidence they deem important. They should be encouraged by experts and scientists to clearly express their concerns; it's not easy to be articulate about uncertainties. But, in the end, some reasonable evidence will have to be presented and evaluated; we need to agree what constitutes fair evidence in a generous sense.”

The mine workforce faces a higher risk of exposure. Is the union satisfied with the levels recorded by mine workers?

“Your statement is an assumption...reasonable, but an assumption. That is, just because workers are working with or close to any hazards does not mean that they are, in fact, exposed more or even at greater risk of such exposure. And that's because there are very stringent OHS laws related to such hazards; it depends just how carefully such laws and regulations are being applied daily and supervised. However, it's true that it's a continuing concern and without special precautions (added and more stringent), your statement would be worryingly true. No, I'm not satisfied with levels recorded, but these are levels most of which are below expected 'safe' standards. The monitoring levels at present are surprisingly low, but any blood level of lead is – in my view – a concern, even if within suggested exposure standards. But then that's my starting position, a stringent and precautionary OHS position.”

Has MMG responded adequately to the concerns which have been raised?

“Yes. But for my liking they still don’t quite understand what good and continuing consultation (and constructive scepticism) is all about; not a new phenomenon in Australian Occupational Health and Safety.”

Are there any areas which need improvement?

“Much more accurate and inclusive consultation with the union (as a knowledgeable representative of the workers) on OHS matters. And this is for obvious reasons.”

Can you make a comparison between how MMG has dealt with these types of safety issues, compared with previous owners?

“The previous owners were very similar in their approach to OHS matters.”

Although exposure levels among workers appear to be within the accepted guidelines, is there a case for the NHMRC to reduce target levels further?

“Yes! More than 50 percent of all ‘safe’ exposure levels (for significant industrial chemicals) have been shown to be wrong over the years, and at times by orders of magnitudes. But industry and regulators don’t effectively understand that the lessons of history are also objective facts; note the tragic history of all forms of asbestos, organochlorines or the more current issues with organophosphates or endosulfan.”

MMG says it has the support of its workforce for the programs it has introduced. Is that what the union hears from workers? Are they satisfied with the company's handling of the matter?

“Yes, it’s what we hear from workers. But we’d prefer a greater access to these workers at their tasks. When it comes to OHS, we remain cynical and very cautious. This does not mean we’re destructive about all this.”

How difficult is it to balance safety issues with the need to maintain the mine, and therefore employment, at Rosebery?

“Not at all. We take the position that all these workers are someone’s children, and just as you’d bend over backwards to look after someone’s children so you should for any worker, anywhere, anytime. This does, at times, create difficult situations, e.g. long shiftwork hours, but the AWU – through me – has taken the position that I’d rather see a worker unemployed for 10 years than dead for 10 seconds!

From the union's perspective, how does the Rosebery mine's operations and safety standards compare to other mining towns around Australia?

“So far as we can tell, it’s good in a number of ways. But see the comments above about more accurate consultation. I remain uneasy.”

13. Working with Lead

By Rosalind Harrison, Toxicologist, Environmental Health Unit, Department of Health and Human Services, Tasmania, in collaboration with Chrissie Pickin, Deputy Director of Public Health, Tasmania.

The concerns raised by the Toxic Heavy Metals Taskforce (The LEAD Group 2010) have opened up various debates relating to heavy metals exposure. Among the issues in the spotlight is the matter of occupational exposure to lead.

Although there are workplace standards for lead exposure in the workplace, it is accepted that blood lead levels of workers can be higher than those of the general population.

So, is it now time to revisit, and possibly, revise those standards?

The fact is that working with lead can affect your health. There is a range of lead-risk jobs which can put you at risk of exposure. These include stripping of old lead-based paints, scrap-processing, manufacture of lead-acid batteries, soldering, smelting, and refining.

For anyone who could be exposed to lead or any lead compounds in the workplace, particularly by breathing in or ingesting dust/fumes, employers are required to take certain steps to protect your health, e.g.:

- Tell you about the health risks of working with lead;
- Check your health through a blood sample to measure the amount of lead it contains;
- Measure the level of lead in the workplace air;
- Introduce control systems or protective equipment to prevent or control exposure to lead; and
- Provide washing and changing facilities.

In this country, Safe Work Australia has agreed national standards and codes of practice for the control and safe use of lead at work (Safe Work Australia 1994a and 1994b). These documents detail the requirements for biological monitoring – this is measuring the concentration of lead in blood and is reported as micrograms (μg) of lead per decilitre (dL) of blood. Biological monitoring gives a good indication of how much lead has been absorbed by inhalation and ingestion. Medical examinations are also carried out.

In Australia, the frequency of biological monitoring depends on the most recent blood lead level and the reproductive age of the individual (Safe Work Australia 1994 a and 1994b). For example, all men and women not of reproductive age will be tested every six months, provided that their blood lead level remains less than 30 $\mu\text{g}/\text{dL}$. Women of reproductive age will be tested every three months, provided that their blood lead level remains less than 10 $\mu\text{g}/\text{dL}$. If levels exceed these figures, then more frequent testing is required. To protect susceptible groups of people, certain individuals can be excluded from working in lead-risk jobs; for example, individuals with certain medical conditions, such as anaemia or kidney dysfunction. Similarly, individuals can be removed from lead-risk jobs if their blood lead level becomes too high. A person is removed if they have a blood lead level of 50 $\mu\text{g}/\text{dL}$ (all men and women not of reproductive age), 20 $\mu\text{g}/\text{dL}$ (women of reproductive age), and 15 $\mu\text{g}/\text{dL}$ (women who are pregnant or breastfeeding). The unborn baby and infants are more susceptible to the health effects of lead than adults (NHMRC 2009a),

hence the need for greater protections for pregnant and breastfeeding women in the workplace.

Around the world, the situation is similar – blood lead levels are checked regularly and individuals can be removed from their jobs if their blood lead levels are too high. In the UK, medical removal occurs at 60 µg/dL (HSE 2002) and in the US, it occurs at 50 µg/dL (averaged over six months) or 60 µg/dL (OSHA 2008), for general employees (i.e. all men and women not of reproductive age). You will not be allowed to return to a lead-risk job until a medical practitioner considers it safe for you to do so.

Based on the scientific evidence on the effects of low-level exposure to lead, it is not possible to make a definitive statement on what constitutes a ‘safe level’ for blood lead concentrations. This is the view of the National Health and Medical Research Council (NHMRC) as well as other international organisations. The NHMRC makes a number of recommendations on lead exposure (NHMRC 2009a and 2009b):

- All Australians should have a blood lead level below 10 µg/dL;
- All children’s exposure to lead should be minimised; and
- All women are advised to minimise their exposure to lead both before and during pregnancy and also while breastfeeding.

The general population’s exposure to lead has decreased dramatically since the 1970s. The decline in average blood lead levels in the general population can be attributed not only to the removal of lead from petrol, but also to programs and monitoring aimed at reducing lead exposure, and other lead-reduction programs (e.g. the phase out of lead-based paints, eliminating lead in food cans, and the replacement of lead water pipes). The Australian Government phased out the use of lead in petrol in 2002 (NICNAS 2003). Although international studies have demonstrated a decline in children’s blood lead levels associated with the elimination of lead in petrol (Hwang et al 2004, Senanayake et al 2004, Schwemberger et al 2005), there is little Australian data in urban environments unrelated to the lead industry. The only nationwide survey of blood lead concentrations in children was conducted in 1995 - the mean blood lead level in 1-4 year old children across Australia was found to be 5.1 µg/dL (Donovan 1996). There has been no follow-up to this national children’s blood lead survey. A more recent four-year study in Sydney children (aged 6-31 months at recruitment) showed a mean blood lead level of 3.1 µg/dL (Gulson et al 2006, NHMRC 2009b). A two-phase study in pre-schoolers living in Fremantle showed a decline in mean blood lead levels between 1993 (6.82 µg/dL) and 2005 (1.83 µg/dL), which the authors concluded likely to be associated with the phasing out of leaded petrol (Willis et al 1995, Guttinger et al 2008).

Recent scientific research has shown that levels of lead which were once thought harmless can now result in adverse health effects (WHO 2000, ATSDR 2007). There is, therefore, a potential concern that the current lead standards allow workers to be exposed to lead at levels now known to be harmful. The Occupational Lead Poisoning Prevention Program is a program in the US which helps prevent lead poisoning in the workplace. Because of the concern regarding low levels of lead exposure, this program recommends removal from lead exposure if (OLPPP 2009):

- Blood lead level is greater than or equal to 30 µg/dL; or
- Two consecutive blood lead levels (taken one month apart) are greater than or equal to 20 µg/dL.

The program goes on to recommend that a return to any lead-risk job should not be considered until two consecutive blood lead levels (taken one month apart) are less than 15 µg/dL (more stringent exposures are recommended for women of reproductive age).

Everyone is exposed to some lead through its natural occurrence in the environment, and its presence in food and drinking water. However, in the workplace, individuals with lead-risk jobs can be exposed to much greater levels of lead than the general population. These days, the workplace can provide the most potential for exposure. Despite workplace guidelines which are in place to protect the health of workers, it could be argued that exposure in the workplace is high, compared with that in the general population and the recommendations of the NHMRC. Perhaps it is now time to focus our attention on lead exposure in the workplace and consider reducing workers' blood lead levels to that of the general population.

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14. The role of toxicologists in the Rosebery investigation

By Chrissie Pickin, Deputy Director of Public Health, Tasmania, in collaboration with clinical toxicologists, Professor Frank Daly and Professor George Braitberg

Toxicologists have played a major role in investigating allegations of heavy metal poisoning in Rosebery, since they were first raised in 2008.

But just what is a toxicologist and how do they arrive at their conclusions?

In simple terms, a toxicologist is a scientist or physician who studies the adverse effects of chemicals on living organisms. This includes the symptoms, mechanisms, detection, and treatment of adverse effects in people.

But, in their day-to-day research, nothing is simple, as toxicologists face the complex and challenging task of determining the relationship between the dose of a chemical and its effects on the exposed organism.

In the case of the Rosebery investigations, three independent toxicologists were brought in to analyse all of the data, to determine whether poisoning has actually occurred or whether other factors are to blame for some residents' health problems.

The allegations were initially investigated by an experienced environmental toxicologist from Monash University School of Public Health and Preventive Medicine, Professor Brian Priestly. Professor Priestly is also Director of the Australian Centre for Human Health Risk Assessment.

In his report released in March last year, Professor Priestly found soil, dust, water and air samples did not show dangerous levels of heavy metals and nor did blood samples taken from residents (Priestly 2010).

Unhappy with those findings, several people sought further medical advice from Dr Andreas Ernst, an Occupational Health and Musculoskeletal specialist.

Based on his assessment of ten patients, Dr Ernst made a diagnosis of heavy metal poisoning, and provided a report to the Director of Public Health, Dr Roscoe Taylor.

In December last year, the Health Department re-opened an investigation into the allegations, appointing two independent clinical toxicologists from Western Australia and Victoria, Professors Frank Daly and George Braitberg.

Professor Daly is Consultant Clinical Toxicologist at Royal Perth Hospital and the West Australian and NSW Poisons Information Centres, as well as Professor of Emergency Medicine and Clinical Toxicology at the WA Institute of Medical Research.

Professor Braitberg is a Consultant Toxicologist and Director of Emergency Medicine at Southern Health – including Monash Medical Centre – in Victoria, as well as Professor of Emergency Medicine at Monash University.

Both have extensive experience in clinical medicine and research, both in Australia and overseas. Professor Daly's overseas experience includes travelling to China, to assist in research looking at the effects of chronic arsenic poisoning in people following environmental exposure. While there, he saw firsthand the effects that substantiated and significant chronic environmental arsenic exposures can have.

Both experts separately reviewed all available data in detail, and concluded that there was no evidence of heavy metal poisoning in the ten cases (Braitberg 2010, Daly 2010).

In his final report, Professor Braitberg described the complex nature of his work.

“A clinical toxicologist is a specialist in drugs, poisons and envenoming, trained to look at the health aspects of any exposure and to use evidence-based principles to determine cause and effect (Braitberg 2010).

“The symptoms must be consistent with the expected signs and symptoms caused by the poison; any signs must fit the expected course of the poisoning and the investigations must correlate with known toxicity levels” (Braitberg 2010).

In the course of their investigations, the experts examined numerous documents, including:

- Files containing doctors’ correspondence, examination and investigation results for ten patients – all current or former residents of Rosebery;
- Reports and a presentation by Dr Ernst;
- Previous investigations into heavy metals exposure in the Rosebery environment, including blood lead testing of residents; and
- The previous toxicology advice from Professor Brian Priestly.

The toxicologists’ review of all the available clinical reports and investigations took into account the known effects of the heavy metals investigated.

They placed particular emphasis on the appropriateness of any test performed and how the test was interpreted.

Their evaluations also incorporated a huge body of international science, research and peer reviewed literature.

Both toxicologists found no evidence of heavy metal poisoning in any of the ten patients.

The Toxic Heavy Metals Taskforce has refused to accept those findings, claiming that the toxicologists’ reports contained numerous errors of fact and incorrect assumptions (The Lead Group 2010).

The Taskforce criticisms claimed that:

- Conclusions drawn were made from incomplete, flawed and deficient DHHS and EPA Investigations;
- Assumptions on possible diagnosis were made without patient consultations or examinations;
- Assumptions on possible diagnosis were made without up-to-date medications lists, accurate medical reports, documentation, correct data and specialist/diagnostic test results;
- Incorrect attribution and analysis of data; and
- Conflicting findings between Professor Daly’s and Professor Braitberg’s reports.

However, the DHHS has defended the toxicologists’ investigations and reports.

The Department says Professors Daly and Braitberg had the objective of assessing the diagnosis of Dr Ernst and determining whether that diagnosis could be supported by objective data or evidence. DHHS says the toxicologists did not try to make definitive diagnoses of the causes of the ten patients’ health problems, but rather assessed what alternative diagnoses could be made and whether the diagnosis of heavy metal poisoning could be substantiated based on the evidence. Each toxicologist was commissioned

separately and individually to write their reports and did so without consulting the other. As such naturally their comments and discussion was different but not conflicting as suggested.

The Department says it provided all clinical information it held to Professors Daly and Braitberg, including all clinical information held by Dr Ernst as at January 1, 2010. The Department says neither it nor Professors Daly and Braitberg had access to the full medical records of each of the residents, and nor were they able to directly examine the residents. But every effort was made to obtain the available clinical information relevant to heavy metal poisoning, for each alleged case. It says the toxicologists did have access to the files of Dr Ernst and relevant materials from a number of GPs and hospital specialists, and were able to comment on whether there was sufficient evidence to support any diagnosis of heavy metal poisoning of any kind and whether there were alternative possible diagnoses or further testing required for the residents. The doctors also indicated where they thought there was insufficient clinical information provided to comment and were able to request further information or tests be sought.

And, the Department says according to Dr Ernst's own notes, he too did not undertake a physical examination of many of the ten patients.

It says both experts made themselves available to discuss the reports with the GPs of each resident, but that this offer has not been taken up.

In their final reports, Professors Daly and Braitberg emphasised the importance of correct diagnosis, and expressed concerns for the welfare of the patients, urging follow-up tests and medical care to properly identify the causes of their various symptoms and the need for clinical management of a number of possible alternate diseases (Braitberg 2010, Daly 2010).

“As a clinical toxicologist practicing evidence-based medicine, the first priority I have to my patients is to provide evidence of cause and effect”, Professor Braitberg said (Braitberg 2010).

“Ascribing cause where none is found has the potential to prevent or delay the detection of the true illness”, he said (Braitberg 2010).

“I believe it is in the best interests of these patients to continue to seek medical assistance to determine the cause of their symptoms”, Professor Braitberg said (Braitberg 2010).

In his final report, Professor Daly said none of the patients met diagnostic criteria for poisoning or adverse health effects by any of the heavy metals, in isolation or in combination (Daly 2010).

They also reviewed the evidence on synergism – an issue Dr Ernst had raised in his reports. Dr Daly concluded that “there is no epidemiological evidence in the peer review literature to support the general hypothesis of synergistic effects in humans exposed to arsenic, cadmium, chromium or lead in an occupational or environmental setting at what would normally be regarded as sub-toxic levels.” (Daly 2010)

The Deputy Director of Public Health, Dr Chrissie Pickin, says three independent national toxicological experts have now confirmed that none of the concerned residents has any clinical evidence to confirm poisoning.

“In addition the toxicologists all concur that there is no evidence of the residents having absorbed metals from the environment at any level likely to cause harm - alone or in combination”, Dr Pickin said.

These findings have been further supported by more widespread blood and urine testing of many other Rosebery residents, including a number of children, for exposure to metals. None of these results have provided cause for public health concern about excessive exposure to metals in the residential environment of the town.

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15. How Government Responded to Concerns From Rosebery

By Dr Chrissie Pickin DHHS, Tasmania

The Consultant Occupational Health Physician was concerned when he saw the result – the sample passed to him by the GP just said “water sample”. If it was a drinking water sample, then the result was most concerning. He immediately contacted the Senior Medical Advisor at the Public and Environmental Health Service. This was in early October, 2008. Around the same time, the owners of the mine - at that stage, OzMinerals - contacted the Environment Protection Authority to let them know that a group of residents had approached them, seeking compensation for contamination of their properties by groundwater seepage. The Senior Medical Advisor did a number of things straight away. He arranged for an urgent analysis of the drinking water supply from Rosebery, and phoned the local GP to discuss the expressed concerns. He then spoke with the local council to obtain some background information on the issue and also attempted to contact the residents.

The Director of the EPA contacted the Director of Public Health. Together, they agreed that a rapid assessment of the potential exposure to heavy metals was required. The EPA sent officers to Rosebery that week, to take water and soil samples at the affected residences. OzMinerals engaged a consultant to determine the source of the seepage.

The Senior Medical Adviser discovered that the residents had seen two local GPs, both of whom said they had no concerns nor saw any evidence of poisoning of the residents.

Almost immediately, the media became involved and much of the Government’s response became tied up with correcting misinformation.

The new water sample and soil sample results were received in late October. They also showed elevated levels of lead - above the Health Investigation Level or HIL. This simply means that further investigations should be undertaken, not that there are any health impacts. Given the long mining history of Tasmania and the fact that the mine at Rosebery was one of Australia's longest continually operating mines, finding elevated levels of heavy metals in the soil was not so unexpected. The level was unadjusted for bio-accessibility. Longer-serving colleagues advised us that the bio-accessibility of lead in the area could be as low as 20-30 percent, and so the potential hazard level suggested would likely be adjusted down significantly. On the basis of this, it was determined by the Directors of Public Health and the EPA that there was no immediate risk to the residents and, therefore, no need for immediate relocation while further investigations continued. In mid November, 2008, the Deputy Director of Public Health, Dr Chrissie Pickin, was asked to bring a multi-agency project team together, to investigate further.

Whenever a potential health hazard is found, there are a number of steps in determining whether this hazard is being, or could be, translated into a risk to human health. These come from the "Guidelines for assessing human health risks from environmental health hazards" produced by *enHealth* - a subcommittee of the Australian Health Protection Committee. (Insert REF) These steps can be usefully summarised as:

1. Assessing the hazard. Is there a substance in the environment which potentially could cause harm to humans? How widespread is it? At what concentration? In what form? What harm could it potentially cause? Given what we know about the hazard, is there anyone in the community who is potentially more at risk of harm?
2. Assessing the level of exposure. Are there any "exposure pathways" - ways in which this potentially hazardous material could enter the human body? Is it in the air and could it be breathed in? Is it in the drinking water and being ingested? Is it in the paint and being eaten by young children? Is it in any food being consumed? Is there any evidence of harm having been done to health? A hazard could be present in the environment (and there are many all around us most of the time) but it can't cause harm to health unless it is absorbed by the body and travels to the "target organs" - parts of the body which can be damaged by the substance. Do any tests on humans show any evidence of absorption or harm to these target organs?
3. Characterizing the level of risk. This process brings together all the information from the hazard assessment and the exposure assessment and provides the key information about the level of risk for individuals and the community.

Clearly, addressing these questions required the help of the Environment Protection Authority (EPA) and others. The project team commissioned one of Australia's leading experts on Environmental Health Risk Assessment, Professor Brian Priestly, who assisted us with the process. The initial samples had been provided by the residents themselves, and the methods they used were unknown and the labs weren't always the NATA-accredited labs we usually use. [NATA: National Association of Testing Authorities, Australia.] So the EPA took further samples from around the area where the initial complainants lived - a small cluster of houses in an older area of the town. These samples identified that there were, as expected, elevated levels of lead, arsenic and manganese in the soil and seepage water. One sample also identified elevated cadmium, but it was reported by those who took the sample that this had been taken beside an old galvanized sheet of metal and subsequent samples revealed no further elevated cadmium. At the request of the concerned residents, air from underneath the residences was also sampled, but these results did not identify any problems. Attempts were also made to obtain indoor air and dust samples, but access to the properties was denied for this.

It is clear from experience and the literature that investigations such as these work best when carried out in collaboration with the concerned individuals and community members. Unfortunately, in the initial stages, this was not possible. It seemed that

every question we asked was assumed to be an attempt to “cover up” what, to them, was blatantly obvious. They were sick or experiencing symptoms and as there was evidence of elevated levels of heavy metals in the environment, it was clear to them that the latter was causing the former and there was no need for any further investigation. They demanded compensation and relocation immediately; first from the company, OzMinerals, and then from the State Government. Yet, we had only found evidence of a potential hazard; moderately elevated levels in some soil and seepage water samples, with the geometric mean below the Health Investigation Levels (HILs).^{*} In addition:

- Interviews and home visits confirmed limited exposure pathways;
- There were no children in any of the premises;
- The residents obtained their drinking water from the town supply, which was found to be safe; and
- Biomonitoring results organised by the residents and ourselves did not identify any evidence of absorption or harm. The few elevated results were found, on further investigation, to have an alternative cause or to be as a result of non-toxic exposure (e.g. fish arsenic, raised cadmium in a smoker, raised serum copper due to pregnancy or hormone replacement therapy).

^{*}**HIL** Health Investigation Level. The concentration of a contaminant (arrived at using appropriate sampling, analytical and data interpretation techniques) above which further appropriate investigation and evaluation will be required. The investigation and evaluation is to ascertain: the typical and extreme concentration of contaminant(s) on the site; the horizontal and vertical distribution(s) of the contaminant(s) on the site; the physico-chemical form(s) of the contaminants; and the bioavailability of the contaminant(s). www.health.gov.au (see ‘Health-based soil investigation levels’.)

In addition to this, we had made available to the concerned residents offers of medical assessments and testing to determine the causes of their signs and symptoms. These were variably taken up. In one complex case, this included the offer of a planned hospital admission with a range of specialist assessments, but this was, unfortunately, declined. Nobody disputed that they had these symptoms, but we were aware of a number of pre-existing conditions and health concerns; the nature of which we are unable to share due to medical confidentiality.

Therefore, the risk characterization was that the risk to these and all other community members was low and could readily be managed with practical control and hygiene measures, as recommended by the National Health and Medical Research Council for all residents, including those of mining communities. This information had already been made available to the concerned residents and had been available in the community over a number of years, through the community education activities of the mine.

Unfortunately, this approach was not accepted by these residents and they formed the Toxic Heavy Metals Taskforce (THMT) and a media campaign was waged to discredit the investigations. There was no reason for the Government to reopen the investigation until November, 2009, when the Public and Environmental Health Service received a call from a private medical specialist, saying he believed that these residents and others had a pattern of symptoms consistent with acute and chronic poisoning by a range of metals. The range of metals reportedly causing the poisoning was wider than those found in the environment, which was intriguing. In discussions, he accepted that the available bio-monitoring results did not show evidence of harm. However, he still concluded poisoning on the basis of “symptomatic taxonomy” and postulated a synergistic effect of the interaction of low levels of metals.

Although much of this sounded, on the face of it, to be implausible, clearly this opinion warranted further investigation. There were some urgent questions which needed to be answered:

- Had new evidence emerged which identified evidence of absorption and harm from the heavy metals? If yes, what was that evidence? If not, on what basis were the diagnoses being made?
- What were the exposure pathways? Were they specific to these residents or were we now looking at a wider public health risk to the whole community?
- Were there any other metals which needed to be tested for that could contribute to this synergism.? The THMT claimed that thallium was a contributor. However, the ore and concentrates contained extremely minute concentrations of thallium, all well below any target levels where they would have any impacts on health or the environment. Any thallium would have been further diluted if they were contained in any dusts leaving the site. Thallium was clearly not a health risk.

To help us answer these questions, we commissioned two national clinical toxicology experts. (See ‘The Role of Toxicologists in the Rosebery Investigation’, in this newsletter.) If there was evidence of poisoning, this clearly had implications for the wider community. If synergistic effects could lead to harm from low-level exposures of several metals, even in the absence of abnormal bio-monitoring results from each metal, then this would have implications for environmental health risk assessment methods across the world, not just Rosebery. (See ‘Synergism at Low Levels of Exposure?’ in this newsletter.) The two toxicologists were provided with background findings from the environmental studies, as well as all the clinical information provided by the specialist, the residents’ GPs and from past hospital records. They were then asked independently to provide comments and advice on the following specific questions:

1. Based on the clinical information provided, is there evidence of exposure to heavy metals at levels sufficient to cause the symptoms, signs or illnesses, as reported by the specialist, in any of these cases?
2. In relation to each specific case, can you make comment on the adequacy of the clinical data to support a conclusion of heavy metal poisoning? Are there other diagnoses that you would recommend which should be considered, and what further investigations would you recommend in each case?
3. Is there a clinical toxicological basis for the claim that there is a public health risk among residents at Rosebery, arising from exposure to multiple heavy metals at low levels, interacting with one another sufficiently to cause synergistic effects and overt disease or pathological processes?
4. Is there a basis for an assertion that pathology testing for exposure to these metals is of no value in assessing human health risk when there are multiple heavy metals involved?
5. If, in your opinion, further investigations are required to determine the answers to the above questions, what investigations would you advise?
6. If you feel that additional expertise is required to answer the above questions, can you define the specific aspects still requiring clarification and recommend additional experts?

The reports of the two clinical toxicologists confirmed that there was no evidence of heavy metal poisoning, nor of absorption of any metals at levels sufficient to cause harm. They did identify a number of possible other causes for the residents’ symptoms and the full reports were shared with the residents, their GPs and with the medical specialist who had first made the claims, to ensure that further appropriate follow-up and treatment occurred. It was around this time that the Public and Environmental Health Service was approached by the new mine owners, MMG Ltd. MMG said it wanted to obtain more “facts” about the wider situation in Rosebery, even though it accepted the findings of our first investigation. The company informed us that it had commissioned environmental and engineering

consultants, Gutteridge, Haskings and Davey (GHD), to undertake a much broader environmental survey, as well as a wide-ranging bio-monitoring program with its mining staff and their families. DHHS and the EPA agreed to meet regularly with GHD, its toxicologist and the mine staff, to ensure that the work met national quality standards and best practice requirements. The mine agreed to share (verbally) its results with us at an early stage so that we could assess any further public health risk.

We all knew that it was important to involve the whole community in this process, so we discussed this with West Coast Council, which had just discussed setting up a Community Reference Group (CRG). The Council agreed to use this forum to keep the community involved in the new investigation. At the first meeting of this group, it was decided that a sub-group should be established, to hear and advise on the methodology of the survey and provide advice back to the CRG on the integration of technical aspects of the work by GHD, as well as the EPA and DHHS. Yossi Berger from the Australian Workers Union (AWU) was an incredibly valuable member of the CRG and had already been trying to mediate between the Toxic Heavy Metals Taskforce and the other stakeholders, so it was agreed that he should chair this new sub-group, known as the Technical Advisory Group. (See 'Union concerns about Rosebery heavy metals –interview with Yossi Berger) Despite the threat of legal action, it was agreed to offer places on both groups to the Toxic Heavy Metals Taskforce. This offer was refused. Following each CRG meeting, a broader public meeting was held to share information and receive feedback.

So how did the CRG shape the agenda? The community members asked that we explain the discrepancy between what they'd read about in the media and our apparent feeling that there wasn't a significant health risk. We did this at a public meeting, where we explained how it was possible to have raised results on blood and urine testing and yet not have absorbed metals from the environment in any significant amount. We explained what the clinical toxicologists had been asked to do and what their general findings were. The CRG discussed the findings of the environmental survey and the results showing that the elevated levels of lead, arsenic and manganese in soil were very randomly distributed. They agreed that a "whole of community approach" was the most appropriate response, because it was not possible to predict which property or area of property may have low or high levels. They noted that other information such as children's blood lead surveys in Rosebery had previously demonstrated that the most at-risk groups were not being adversely impacted. To ensure the ongoing protection of children, they requested that we work with the local schools and child care centre to foster children as "hygiene champions". They raised concerns about dust issues, arising from trucks coming to and from Rosebery and other mines in the area. Also discussed was the fact that, unlike Port Pirie and Mount Isa, Rosebery is not a "smelter town", and, therefore, the exposure pathways of airborne emissions is much less. Dust control measures relate to localised fugitive emissions sources, such as the crusher. The EPA agreed to undertake a spatial analysis of dust monitoring data from around Rosebery, to determine where in residential areas possible impacts may arise from metals in dust deposition from the mine. This identified an area of marginal concern (which was not the area in which the original residents lived).

As a result of the investigation results and informed by the deliberations of the CRG, the agencies involved developed and implemented the following plan of action:

The EPA has:

- Discussed the analysis of dust results with MMG to determine where more appropriate dust monitoring should be undertaken;
- Identified more appropriate dust background monitoring locations; and

- Is in the process of incorporating tighter and more extensive dust monitoring and dust management requirements into the mine's operating conditions.

The new EPA operating conditions and the commitments and actions already undertaken by MMG should help to significantly reduce any dust from the mine affecting local residents.

DHHS has:

- Facilitated a meeting between MMG and the local high school and primary school, at which a range of measures were agreed to, aimed at improving children's diets (see "Seventy-Five Years of Mining in Rosebery, which includes a reference to the program 'Eat Well Tasmania'), raising awareness of the importance of good hygiene and inspiring the children;
- Met with the manager of the child care centre who was well aware of the issues and who ran a very clean establishment. We agreed to conduct further indoor testing which showed very low levels of dust and even lower levels of metals in it, even after the children had traipsed in mud from playing outdoors;
- Began discussions with the local area health service to commence a community health plan for Rosebery;
- Met with the manager of the Rosebery Community House and agreed to provide more information for the public on why good hygiene was important when living in a mining area (particularly one with heavy rainfall). In addition, DHHS made available HEPA filtered vacuum cleaners for use by community members;
- Continued discussions with stakeholders about supporting ongoing monitoring and surveillance of blood leads in children in Rosebery; and
- Responded to inaccurate media and other reporting of the situation in Rosebery, including guest editing this newsletter.

The operator of the mine, MMG, has:

- Completed works in the rail yard loading area, to minimise the amount of dust leaving the site. This was an area where, previously, dust had the potential to leave the site. This has included installing dust curtains and water sprays; and
- Is undertaking works on the ore stockpile areas to reduce dust emissions.

Mr Roy Ormerod, General Manager, Workplace Standards Tasmania, was also a member of the Rosebery Community Reference Group. As the regulator of workplace health and safety laws he was keen to ensure that the interests of workers were considered. 'I am impressed with the level of rigour that has been applied', Mr Ormerod said. There is no doubt that everyone is taking the monitoring and testing process very seriously', he added.

Mr Ormerod concluded that evidence collected so far clearly indicates that Rosebery is a safe town in which to live and work. However, this does not mean people should become complacent. Safe work practices needs to remain foremost in the minds of workers and managers alike' Mr Ormerod said.

What still needs to be done?

DHHS is continuing to work with the local area health service to develop a community health plan for the area which will address many of the health issues in Rosebery. We are hopeful that this will contribute to improved diets among the children of the town. We are contacting and, on occasion, visiting other mining towns to explore whether there are further ways in which we can protect children. The Technical Advisory Group is preparing

a final report to go to the Community Reference Group. MMG is preparing to open a new centre to support residents in understanding the potential hazard of heavy metals in the town and how they can continue to avoid being harmed. The vigilance and the collaboration continues.

16. Synergism at Low Levels of Exposure?

By Rosalind Harrison, Toxicologist, Environmental Health Unit, Department of Health and Human Services

Humans are constantly exposed to a wide variety of man-made and naturally occurring chemicals simultaneously (Feron et al 1998, Sexton and Hattis 2007). This poses challenges to risk assessors because many different types of chemical mixtures can occur in the environment, and the hazards associated with such combined exposures may be different from when chemicals are considered individually (De Rosa et al 2004). Furthermore, there is an increasing awareness in the general population of simultaneous exposure to chemicals. Rosebery is a heavily mineralised area, and hence the Rosebery mine has operated continuously since 1936, with current potential beyond 2020. From the extensive environmental sampling program carried out by GHD consultants, in consultation with the mine operators, Minerals and Metals Group and the Environment Protection Authority, it is known that a number of metals exist in combination in the Rosebery environment.

Humans have always been exposed to metals, either through natural geological occurrence, resulting in contamination of food crops and drinking water, or through pollution from industrial and other human activities (Carpenter et al 2002, Lu and Kacew 2009). Some metals are essential to health, but may be toxic at high levels of exposure. Other metals have no known beneficial function, and long-term, high-level exposures may be harmful to health (Lu and Kacew 2009).

There are different ways in which chemicals can interact (ATSDR 2001, WHO 2009). Synergism comes from the Greek word ‘*synergos*’, meaning working together, and is one type of toxicological interaction. Synergism occurs when the effect caused by exposure to two or more chemicals at the same time is greater than the sum of the effects of the individual chemicals (CCOHS 2004). More simply, synergism is when a mixture of chemicals produces a stronger effect than could otherwise be predicted, i.e. more than additive, such as 1 plus 1 is greater than 2. Synergy is a public health concern because exposure to individual chemicals, which are considered to be safe, might pose unacceptable health risks when exposure occurs simultaneously to a combination of such chemicals. Therefore, the potential hazards of any chemical mixture need to be considered. Other types of interaction from exposure to mixtures can also occur; e.g. “additive” (when 1 plus 1 equals 2), or “protective” (when the presence of one substance reduces uptake of, or inhibits harm from another – e.g. zinc can reduce absorption of cadmium) (ATSDR 2001).

Synergistic interactions are known to occur in some situations. For example, there is a higher incidence of lung cancer resulting from simultaneous exposure to asbestos and tobacco smoke (through smoking), than would be expected from simple addition of the effects of asbestos and tobacco smoke acting independently (Erren et al 1999). However, synergistic effects such as this have only been shown to occur at high levels which are probably unrepresentative of the exposure levels present naturally in the environment. At

relevant environmental exposures, i.e. low (non-toxic) doses, interactions between chemicals have not been shown to occur. Synergistic effects are typically only observed at high exposures – well above the toxicity threshold for each individual chemical; and it has been proposed that there is an interaction ‘threshold’, below which interactions in chemical mixtures are unlikely to be relevant (Feron et al 1998, Konemann and Pieters 1996, Yang and Dennison 2007).

The Department of Health and Human Services (DHHS) undertook to address concerns regarding the presence of metals in soil and groundwater in Rosebery and the possibility that these metals may be interacting synergistically. The DHHS has considered whether there is any evidence that synergistic interactions can occur following exposure to a range of metals in the environment, including whether adverse human health effects can occur despite normal biomonitoring data. Focussing on interactions associated with exposure to lead, arsenic, manganese, together with their potential interactions with other metals, the DHHS has concluded from the available evidence that interactions between metals have not been shown to occur at low levels of exposure for each individual metal (ATSDR 2004a, ATSDR 2004b, Choudhury and Mudipalli 2008, Wang and Fowler 2008). The understanding of the DHHS, supported by toxicologists who were consulted for advice, is that synergistic interactions and any resultant adverse health effects are associated only with high levels of exposure - at or above the individual toxicity threshold level for the metals concerned.

Overall, there is no evidence that low levels of exposure to mixtures of arsenic, lead and manganese in the Rosebery environment (based on the biomonitoring results) is resulting in synergistic interactions.

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17. Are our pets safe?

By Bronwyn Hill, Communications Consultant

(This article was written with the collaboration of Dr Mary Lou Conway, Deputy Chief Vet, Department of Primary Industries, Parks, Water and the Environment; and local vet, Dr Ron Harris)

The debate over the effects of heavy metal waste now extends to domestic animals in Rosebery and the West Coast region.



Some former residents have expressed grave concerns about the untimely and agonising deaths of their cats and dogs, attributing this to toxic heavy metal poisoning.

However, the experience of most residents tells a different story.

Local vet, Dr Ron Harris, has been practicing on the West Coast since 1997, with clinics operating during this time at Rosebery, Zeehan, Strahan and Queenstown.

Sparta and Duke, Jo Powell's dogs

At present, Dr Harris operates a clinic at Queenstown only, but continues to see animals from all centres on the West Coast. It is now a stand-alone veterinary practice, after operating as a branch practice of the Scottsdale Veterinary Service until January, 2010.

Dr Harris said veterinarians attending animals on the West Coast have kept patient records for all animals seen in the region over the past 12 years.

He said he can't speculate about the cause of death for those animals about which concerns have been raised, because he didn't examine them, but he said these concerns prompted him to review the clinical records of animals from the area.

"These records and my own anecdotal evidence do not indicate that animals from this area have any substantially greater incidence of overt poisoning or unexplained deaths compared with either animals from other parts of the West Coast or to animals from our main practice in the north-east of Tasmania", Dr Harris said.

The Deputy Chief Vet with the Department of Primary Industries, Parks, Water and the Environment, Dr Mary Lou Conway, is also unable to comment on specific cases, for reasons of confidentiality.

But she said the symptoms identified in some dogs and cats are consistent with stomach cancer or other illnesses which can be genetic.

She also said the environmental test data which has been made available to the Animal Health and Welfare Branch to date does not appear to indicate a particularly toxic environment.

"To date, based on inquiries of the veterinarian servicing the West Coast and interrogations of the Mt Pleasant Animal Health Laboratory database for the past 11 years, no evidence of a Rosebery-wide cluster of ill health in animals has been found", she said.

Dr Conway said animal data for valid comparison is limited, and comprehensive clinical data is also necessary to fully explore the potential risks to animals of the wider Rosebery community as well as individual residences.

Dr Conway said many factors can contribute to toxicity in animals.

These factors include:

- Type of substances (inherent toxicity), and their state (gaseous, solid, liquid) at the time of exposure;
- Solubility of the substance;
- Type of exposure (skin, inhaled, eaten);
- Size of the dose/s;
- Time over which exposure occurred;
- Species and age related susceptibilities;
- Pre-existing or concurrent health issues in the animal; and
- Mitigating or exacerbating factors in the immediate environment.

Dr Conway said as long as the toxin dose is not overwhelming, there are detoxifying or at least ‘quarantining’ processes within the body that reduce the risk or effects of toxicity.

She said cases of toxicity presented to veterinarians are usually very acute and the result of a single or closely grouped multiple exposure event.

She said the signs of toxicity are often non-specific and require generic treatment to promote survival while a definitive diagnosis is reached.

“There are many non-toxic conditions that look like acute poisoning”, she said.

“Therefore a full patient history and clinical examination is vital to investigating and treating suspect toxicities”.

The West Coast veterinarian practice run by Dr Harris has offered to carry out tests on any animals about which residents have concerns.

However, he pointed that at this stage, the types of testing available and the reference ranges for normal/toxic values of various heavy metals are quite limited.

He said there are no “screening” tests available for metals poisoning, meaning the client and the attending veterinarian must request for which elements tests are required.

He also said that, because samples are tested by various commercial laboratories, the costs of sampling and testing are the responsibility of the animals’ owners.

In the meantime, animal health authorities have urged residents to take sensible precautions to ensure their pets are not exposed to dangerous levels of heavy metals, and to seek urgent veterinary assistance if their pet is, or has been, acutely ill.

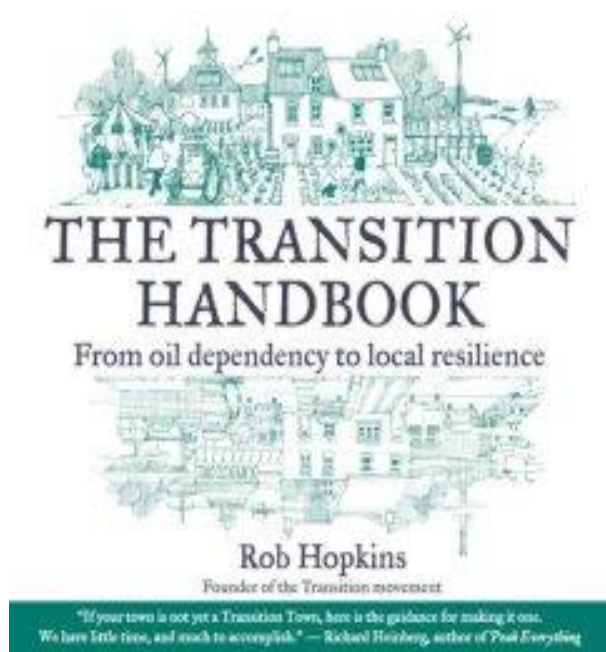
Dr Conway says there are some simple measures which residents can take to minimise any risk to their pets:

- Pets should not be encouraged to roll in dirt.
- Dogs and cats should be bathed and pet bedding cleaned regularly.
- Lawns can be very effective in minimising pet and human exposure to soil
- Always ensure pets have access to clean drinking water, and that the water container is clean and refilled regularly.

18. Heavy Metal Gardening

By Ian Smith, Systems Analyst for The LEAD Group Inc.

Walking up from the dam, well pond really, and the neighbours are blaring out AC DC VERY LOUD in the otherwise still of a late gold afternoon, breaking the ambience of the bush and I could witness myself railing against the invasion. It gave pause to reflect on neighbours in general and specifically their capacity to pollute adjacent lands with heavy metals, both the musical and the periodic table of the elements kinds. When in the garden, it seems we're all going to need a bit of metallurgist in us. For the record, in the heavy metal music sense, I'd have preferred Led Zeppelin. AC DC is for redneck with mullets (a hairstyle short at front and sides, long at the back.).



The Transition Handbook (Hopkins 2008), a guide to building an oil-independent, resilient community of low-mileage food grown and consumed locally, was insightful into the sociological means to boot-strap that community, but light on for the practical techniques needed to do that in an inner-urban environment. As the cities have grown, the small 'mum & pop' factories on the edge of town have been pushed further out, amalgamated through industrialisation into mega-factories. Small petrol stations have succumbed to consolidation into the current oligopoly. The inner-west of Sydney for instance, where once were factories or petrol stations, now are housing. Before building up our socially-aware network of inner-city gardens, we need to add some metallurgy to our bonhomie.

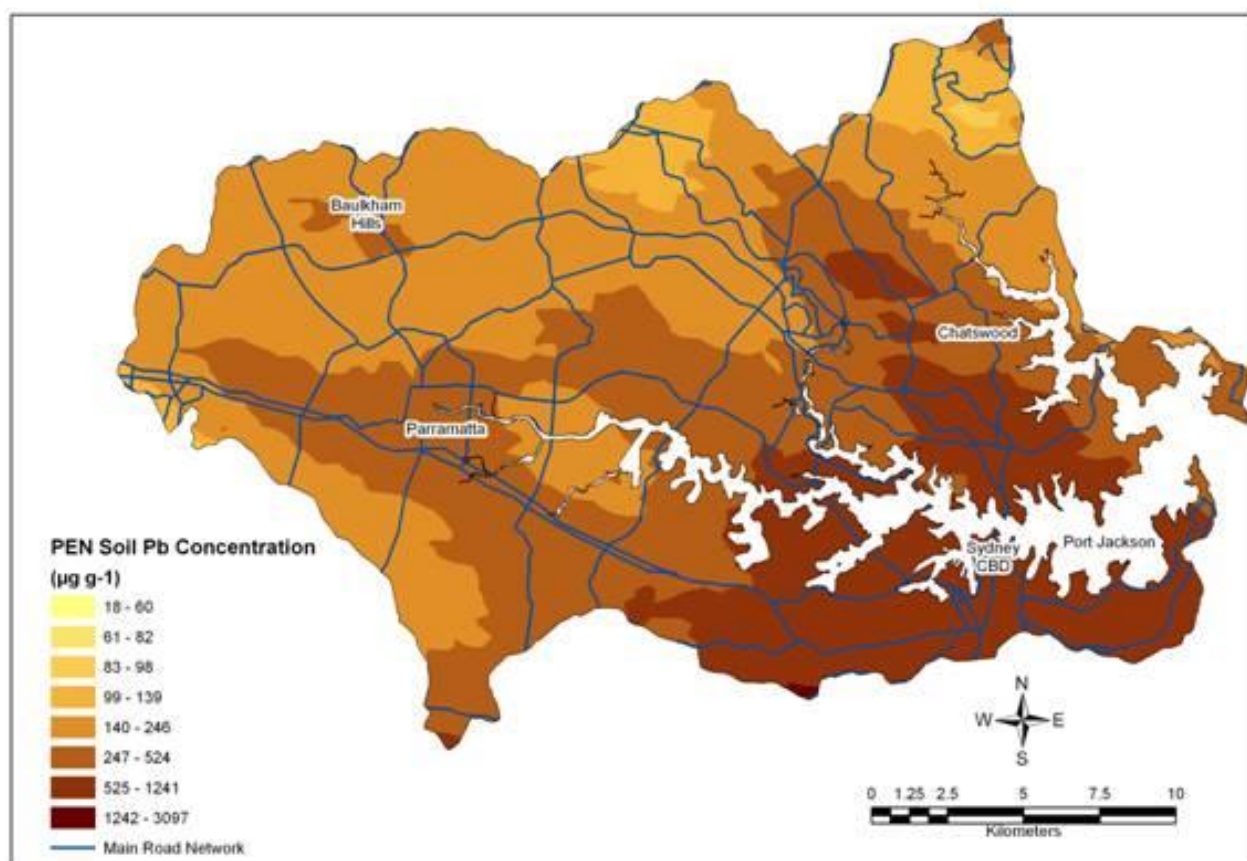
Driving in the inner-west of Sydney a few weeks back, I saw a newly dug community garden. At first glance it was uplifting to see the dungaree'd inner-city types getting into the swing. But the site is boxed in on three sides by old buildings, the busy road in front & a railway line nearby. It's highly likely over the last few generations of slight ignorance (not even gross negligence), that this garden & the many others like it in a Transitioning world have been contaminated with heavy metals and toxic chemicals.



A community garden in the inner-west of Sydney

Garden sites, especially those scaled at a community level, should be assessed before anyone gets digging. The primary means of human contamination is through skin contact or ingestion and all that can have happened, the damage done & dusted before anyone's grown a single green leaf.

Unfortunately it's not as easy as a Dial Before You Dig Hotline (1100 in Australia) if you think you're going to dig some metal in the form of power, water or phone lines) to see if there's contamination. Where the contamination lies is not in an all-seeing government database. There is a Sydney region map (Vanderheyden 2006 and Birch et al 2010) that Sydney locals can use to at least get an idea of the lead in your locality. This pattern of high contamination in the old hearts of fuel burning cities is likely to be repeated in all old cities, with Australia's relatively new cities likely to be better off than the much older cities in other parts of the world.



Before getting yourself dirty clearing away the weeds and get yourself covered in something you'll regret later, get The LEAD Group DIY Sampling Laboratory test kit (www.lead.org.au/q&a/2006/20060516001.html) and get a few soil samples taken, from a couple of different places and have them analysed for the presence of lead or other heavy metals. While you're at it, have the pH tested – this tells you how acidic or alkaline the soil is, which determines whether you need to add lime for certain vegetables, etc. [Editor's update, February 2021: See Andrew Scott's soil pH measurement / troubleshooting guide at <https://wellgardening.com/soil-ph/>]

Up to 20ppm Lead is background noise. Go your hardest & happy gardening.

Above 100 ppm? "Because of the possibility of bare soil exposure to children through hand to mouth activity, soils with lead levels exceeding 100 ppm should not be used for gardening. If soil exposure to children is not a concern, then plants can be safely eaten from soils with soil lead levels up to 300 ppm." (Rosen, 2002). So, give up growing your own vegies at this point if you've got small children. The primary pathway of lead

poisoning in children is ingestion; a child's response to yummy dirt is to eat it, and the worst possible time to be poisoned is as a child, so just don't grow vegetables. A garden can provide more than just food for the stomach.

300 ppm. OK. There's lead there. Lots of. But manageable. We are, after all, hard-rocking metallurgists in the garden this morning.

If the soil pH* is kept up above 6.5, then the plants don't seem to want to take up the lead. So add a bit of lime (and a soil pH meter from the garden supplies shop).

* **Soil pH** is a measure of the [soil acidity](#) or [soil alkalinity](#). An acid solution has a [pH](#) value less than 7. (Wikipedia 2010)

[Ed's note: Vegetables have a pH value at which they produce their best results. Some prefer quite acid soils. See [The Garden Helper](#) 2010]



You can also add some good quality humus. Plants don't absorb lead so much when the soil contains real nutrients, and you can seriously thin down the contamination ppm (parts per million) by volume, for a small garden anyway, with a boot* load of soil.

* boot - US, trunk of car

Above 300ppm? Nasty. We're talking serious site remediation. Take off & remove the top soil layer to 10 cm or so [Ed's note: Some councils require a development application to take soil away from a property] or add raised sealed beds and new soil onto the site. [Ed's

note: sealed off from the soil by an impermeable barrier, such as a sheet of builders' plastic.] Otherwise it's the farmers' market for your fresh greens. But even then... apparently even with sealed, raised beds, contaminated soil is still finding new pathways especially *onto*, but also *into* produce from the raised garden beds. It could be through the gardeners' actions, or rain & wind action lifting or spattering contaminants into the bed from the nearby source (The Geological Society of America 2010). You can get around this by removing the top inch of topsoil each year.

But a good washing of all leafy greens, and peeling & washing the root crops will fix most contamination. There is far more likelihood of surface contamination than through uptake of lead by the plant itself.

Next time I mean to drive past that new community garden, I should take my dungarees, and a sampling kit.

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19. Community Consultation: How community members can control their role

Principal author: Isla Macgregor, with thanks to: Dr Alison Bleaney of the Tasmanian Public and Environmental Health Network; Dr David Obendorf, Veterinary Pathologist, Founder, The Tasmanian Ecotoxicology Research Fund [TERF]; Brian Martin, Professor of Social Sciences at the University of Wollongong; Elizabeth O'Brien of The LEAD Group and National Toxics Network; and Mariann Lloyd-Smith of the National Toxics Network, December 2010

Community Discussion and Information Gathering

Community members need to get together to meet and supportively participate in identifying and discussing openly and constructively the issues of concern. It is important to discuss what are the outcomes different individuals and groups want.



A 1977 Herbblock Cartoon, copyright by The Herb Block Foundation.

Community members need to identify what information/data is already publicly available and what information/data needs to be made publicly available. Frequently, information can be found online or sometimes in State archives or libraries.

Those people in the community who want to work on the issue need to be supported by others in the community as much as possible. Having a website where requests for support can be listed, and taking all other opportunities, such as at public meetings, to request specific support is recommended.

It can be useful to phone, write and/or email relevant authorities, companies or organisations and request all information

that is not currently publicly available. It is important to find out what information is being withheld under commercial confidentiality regimes.

It is worthwhile to make contact with other community organisations or non-government organisations (National Toxics Network, LEAD Group Inc, Environmental Defenders Office (EDO), etc.), in your state or nationally, that work on similar issues or that can provide you with legal advice. Seek their advice and study all their relevant information. If possible, ask them to work with you on the issues. No need to re-invent the wheel.

When all available information has been collated and summarised, distribute the most relevant information widely in the community by whatever means possible and then hold a community meeting to discuss it. After discussion and agreement on the appropriate consultation process necessary, invite relevant government officials to attend a community meeting to provide their views, information and action proposals on the issues.

All community consultation meetings must be open to all people, with no confidentiality requirements, and minutes moved and agreed to and posted on a dedicated website (which may be government-funded) immediately afterwards. All new information that becomes available should be posted on the dedicated website also. It could also be useful to identify possible stakeholders – e.g., unions, researchers – who are not yet involved in the issue, in order to gauge their support.

Consulting with Government

Community members need to listen to what government officials have to say without feeling they need to respond immediately to any government proposals. The first meeting with government representatives is an opportunity to let the government representatives have their say, ask questions and clarify any issues of concern. Use the chance to find out what is known, what has been decided and why.

Following the presentation by government representatives, community members need to discuss a way forward, including: seeking expert knowledge in their own community as well as outside independent expert opinions, developing a time line for action and formulating proposals for resolving the problems with a big-picture long-term perspective. Public health needs to be the priority.

Public and Environmental Health Investigations

When an independent population-based public and environmental health investigation needs to be established,

Quotable Quotes:

I stand convicted by me, myself, alone, and not by anyone else, as a plunderer of the earth....By our civilization's definition, I am a captain of industry.... It (the market) will allow the externalization of any cost that an unwary, uncaring, or gullible public will permit to be externalised – caveat emptor in a perverse kind of way. My God! Am I thief, too?

– **Ray Anderson**, 1998, CEO of [Interface, Inc.](#) from pg 5-6 of his first book, [Mid-Course Correction](#).

If you don't look, you don't find and if you don't find, it doesn't exist!

- **Anonymous**

The truth dilemma: The absence of evidence does not mean the evidence of absence.

- **Dr David Obendorf**, Veterinary Pathologist, Founder, The [Tasmanian Ecotoxicology Research Fund](#) [TERF].

this should include an investigation into people's health as well as the wellbeing of domestic animals, wildlife, aquatic species, the environment, vegetables and crops.

Proposals by government bodies to conduct health investigations need to be reviewed by community members at all stages in relation to other similar or best practice health investigations. Health investigations that will be thorough and robust are better than those that fail and waste taxpayers' money. Seek critical expertise and experience to review what is being done.

If community members want to have a Health Advocate the position needs to be funded by government, with community members approving any appointment. A pamphlet from the Office of the Health Complaints Commissioner needs to be made publicly available to all participating residents so that they fully understand the rights and responsibilities of patients and medical providers.

The government needs to fund all medical expenses and treatments required by participants involved in any investigation that relate to the contamination issues under investigation.

Community members need to set protocols (a set of guidelines to be followed) for environmental sampling procedures inside or outside of homes on private property.

Community members have a right to expect government-funded peer review of all medical and scientific reports by experts chosen by community representatives.

To minimise the risk of exposure to environmental contaminants, community members can design a government-funded Household Audit Service to advise residents on how best to reduce these risks.

FURTHER READING:

OTHER AUSTRALIAN GUIDES ON COMMUNITY CONSULTATION

National Toxics Network (NTN) (2006) *Community Engagement* [Extensive information on effective community engagement with supporting documents], NTN, 15 November 2006, <http://ntn.org.au/2006/11/15/community-engagement-2/>

NICNAS (National Industrial Chemicals Notification & Assessment Scheme) (undated) *NICNAS Community Engagement Charter 2005-06*, Australian Government, Department of Health and Ageing, http://www.nicnas.gov.au/community/cef_charter_pdf.pdf

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