A Snapshot of Tasmanian Non-Microbiological Detections in Drinking Water July 2013-June 2014.

Selected Breaches of Australian Drinking Water Guidelines

Report compiled by Anthony Amis (October 2015)

Friends of the Earth Australia

Approximately 3000 Tasmanians were drinking water at levels consistently above Australian Drinking Water metals and disinfection by-product Guidelines and excessive Aluminium levels during 2013-14. Over 20,000 Tasmanians were exposed to excessive levels at some time during 2013-14.

Of most serious concern are lead levels in drinking water in up to 10 Tasmanian communities, but particularly Cornwall, Fingal, Avoca, Winnaleah, Ringarooma, Pioneer and Rosebery. Cadmium detections at Avoca are also worrying, as are aluminium levels detected in Tullah, Lady Baron and particularly the Manuka River, which supplies drinking water to Strahan. Chlorine disinfection by-products for Colebrook are also unacceptable.

Contents

Glossary

ADWG: Australian Drinking Water Guidelines
Alum: Aluminium Sulfate
AMD: Acid Mine Drainage
BDCM: Bromodichloromethane
DBP: Disinfection By-Products
DCA: Dichloroacetic Acid
DHHS: Department of Health and Human Services
FoE: Friends of the Earth
HAA: Haloacetic Acid's
IARC: International Agency for Research on Cancer
mg/L: parts per million
NHMRC: National Health and Medical Research Council
NOEL: No Observable Effect Level
NOM: Natural Organic Material
Pb: Lead
RTI: Right to Information
THM: Trihalomethanes
µg/L: parts per billion
TCA: Tricloroacetic Acid
WHO: World Health Organisation

Introduction

In late July 2015, a South Australian based toxics researcher, forwarded to Friends of the Earth (FoE) copies of excel spreadsheets that he received under Right to Information (RTI) legislation in Tasmania, concerning heavy metal/pesticide detections in Tasmanian water supplies between July 2013 and June 2014.

After looking over the data, FoE suggested that some of the information provided by TasWater was erroneous, as it was unlikely that certain heavy metals such as Selenium would have been detected above Australian Drinking Water Guidelines (ADWG) in a number of Northern Tasmanian communities. (Other misinformation in the spreadsheets showed excessively high levels of arsenic and cadmium for the town of Bicheno). FoE was also concerned that data concerning lead was incomplete or lacking. Although the majority of information appeared to be sound, the mistaken data severely eroded any confidence in the accuracy of all the information.

This is unsatisfactory and one wonders if the accuracy of these RTI applications was so poor, then what of other RTI's provided by TasWater to the general public?

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The problems reveal obvious problems in terms of information management and RTI procedures within TasWater. Some of the questionable data appeared to be simply cut and pasted into existing spreadsheets, without due diligence or quality control. Some of the measurement scales were in parts per billion, others in parts per million with no consistency throughout. It seemed that parts of the spreadsheets had been cobbled together to give the impression that all of the data was present and accounted for.

It was suggested that the researcher write back to TasWater explaining the problems with the data and request that more accurate information be provided. Several weeks later "new" copies of spreadsheets were sent, including TasWater detections for Disinfection by-products. Again the data appeared to be incomplete and problematic, with at least 50% of lead detections for Rosebery not forthcoming and new information concerning trace levels benzene and pesticide detections included for Currie which appeared at odds with TasWater published information. Nevertheless, despite these concerns it was decided that most of the data appeared sound. A report was finalised and ready to be published.

Then a message from the South Australian researcher in mid-October stated that the final information for Rosebery had finally been sent to him. This then meant that the Friends of the Earth report had to be updated to include the Rosebery data.

Due to time constraints, for this report FoE has focussed on detections of heavy metals and disinfection by-products above ADWG's. FoE could have included other issues that were included in the second lot of RTI such as Ecoli, Chlorine and Fluoride, but decided that these issues would simply

confuse the original issue of wanting to determine the extent of toxic metals in Tasmanian drinking water.

There were three sources of information which needed to be cross-referenced in order to produce this report. Because of the differences reported by these agencies it was decided to use all three sources of information as a means of highlighting discrepancies and ranges of detected toxicants.

Sources of information included:

1. Spreadsheets (Second version of spread sheets supplied by TasWater under Right To Information) and missing Rosebery spreadsheets finally sent through in October 2015.

2. TasWater Annual Drinking Water Quality Report 2013-14.

3. Department of Health and Human Services Annual Report Drinking Water Quality of Public Water Supplies in Tasmania for 2013-14.

Information contained within the spreadsheets (Version 2) and Rosebery spreadsheets were analysed against health guidelines published in the Australian Drinking Water Guidelines (ADWG). Any breaches to the guidelines were recorded on a town by town basis. Toxicant levels that were under the Guideline levels were included in determining average detection levels.

A comparison of the three sets of data is useful is showing the inconstencies of reporting.

DHHS conduct specific independent water quality monitoring and in 2013/14 did so in a number of locations. Extracts from the TasWater Annual Drinking Water Quality Report 2013/12 show that DHHS conducted additional testing upon notification at various locations around Tasmania including Cornwall, Derby, Mathinna and Rossarden. Lead was detected above Australian Drinking Water Guidelines at all of these locations. The lower number of test results is also a reason why DHHS averages for various substances are higher than many of the results supplied in the RTI and TasWater Annual Drinking Water Report data.

The DHHS testing is explained in an email received in September 2015:

"The DHHS conducts its own sampling of public drinking water supplies at times around the State, as a way of generating independent verification of water quality. The program has been running since 2012-13 and generally targets non-microbiological water quality and levels of fluoride.

The timing of the sampling is not disclosed to TasWater nor are which water supplies will be sampled. Any monitoring result that is non-compliant with the health related values of the ADWG is referred to TasWater for investigation, intervention and resampling.

DHHS reports non-compliant monitoring results in its Annual Drinking Water Quality Report, which is published annually and available on our website. To date, this report has not included the non-compliant results from our own independent monitoring. However, these additional results will now be included in future annual reports". Source: private email

Some of the discrepancies are explained in the following four tables.

Total Number of ADWG Breaches (excluding Aluminium + BDCM)		
RTI	DHHS[1]	TasWater Annual Report
79	76	79

Total Number of ADWG Lead Breaches		
RTI	DHHS[1]	TasWater Annual Report
24	20	30

Total Number of ADWG Lead Breaches (Rosebery)		
RTI	DHHS[1]	TasWater Annual Report
17	15	15

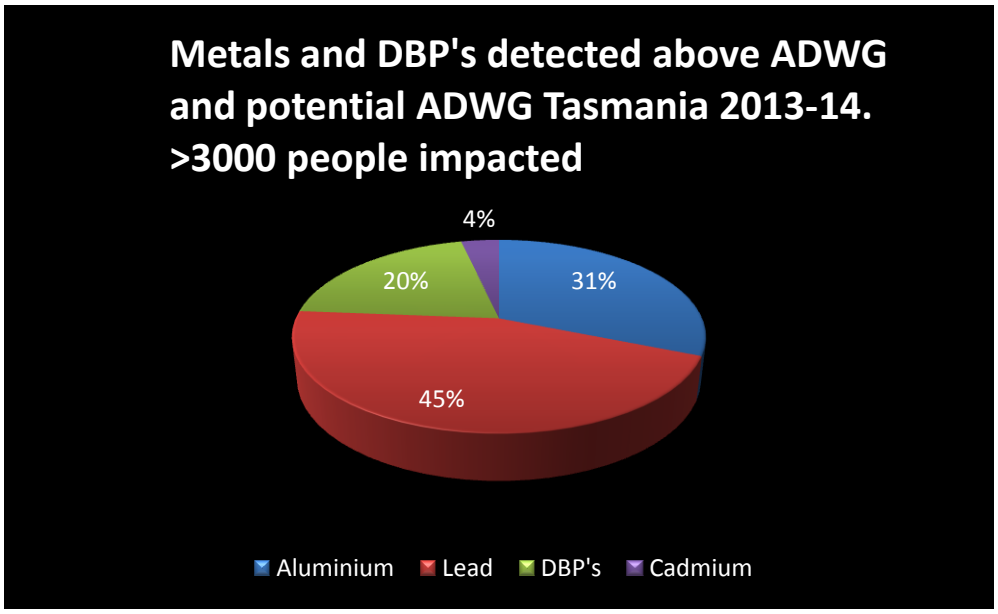
Total Number of Towns With Lead Breaches		
RTI	**DHHS[1]**	TasWater Annual Report
7	5	10

Notes
1Tasmanian Department Health & Human Services *Drinking Water Quality Report* 2013-14 page 23

Results

The RTI information showed that there were 79 breaches to the Australian Drinking Water Guidelines. The breaches occurred in 18 communities. The most frequent breaches were for Trichloroacetic Acid, which is a Chlorine Disinfection By-product. Trichloroacetic acid breaches occurred in 5 communities, with 19 alone in the community of Colebrook. Lead levels were the next most frequent breach to Australian Drinking Water Guidelines. [Friends of the Earth also asserts that another 55 potential breaches for Aluminium occurred between July 2013-June 2014, making this the most widely detected problem in Tasmania. There is however no health guideline for Aluminium in Australia. FoE is concerned that the community remain uninformed about issues related to Aluminium].

During 2013-14 approximately 3000 Tasmanians were drinking tap water at levels which consistently breached the Australian Drinking Water Guidelines. The figure below shows for metals (45%), disinfection by-products (20%) and excessive Aluminium levels (31%)



Perhaps as many as 20,000 Tasmanians were at some time during the year exposed to drinking water which exceeded ADWG metals, disinfection by-product guidelines and Aluminium levels exceeding 0.5mg/L during 2013-14.

Of most serious concern are lead levels in drinking water in up to 10 Tasmanian communities but particular in Cornwall, Fingal, Avoca, Winnaleah, Pioneer, Ringarooma and Rosebery. Cadmium detections at Avoca, aluminium levels detected in Tullah, Lady Baron the Manuka River, which supplies drinking water to Strahan are also a concern. Detections of chlorine disinfection by-products for Colebrook are also unacceptable.

Breaches of Australian Drinking Water Guidelines – 3 information Sources			
Chemical [1,2]	**RTI Data**	**DHHS** [3]	**TasWater Annual Report** [4]
Aluminium*	**55**		
Cadmium	**2**	**2**	**2**
Lead	**24**	**20**	**30**
Manganese		**1**	**1***
Dichloroacetic Acid	**11**	**13**	**11**
Trichloroacetic Acid	**32**	**37**	**32**
Trihalomethanes	**4**	**3**	**3**
Bromodichloromethane *	**6**		

Notes

1. No health guideline exists for Aluminium in drinking water in Australia. An aesthetic guideline of 0.2mg/L is published in the ADWG. FoE is recommending that a health guideline be established at 0.5mg/L. All breaches of Aluminium in this table exceed 0.5mg/L. Because there is no health guideline, TasWater do not have to report on breaches of Aluminium.

2. No health guideline exists in Australia for Bromodichloromethane. BDCM levels are calculated along with Chloroform, Bromoform and Dibrmochloromethane to give a Trihalomethane value. The World Health Organisation has a BDCM level of 0.06mg/L. This level has been adopted in this report. Because there is no health guideline, TasWater do not have to report on breaches of BDCM levels, only breaches of THM's.

*3.Tasmanian Department Health & Human Services *Drinking Water Quality Report* 2013-14 page 23

*4. Refer *Tas Water Annual Drinking Water Quality Report* 2013-14 page 158 Distillery Creek "6.20.4 Analysis of Current Performance and Historic Trends

Breaches of Australian Drinking Water Guidelines (including Aluminium & BDCM) – 3 information Sources

Water Supply	RTI Data	DHHS [1]	TasWater Annual Report
Avoca	**4** (Aluminium 1, Cadmium 2, Lead 1)	**2** (Cadmium 2)	**3** (Cadmium 2, Lead 1)
Cam River	**1** (Aluminium)		
Colebrook	**26** (Aluminium 1, Trichloroacetic Acid 19, Dichloroacetic Acid 4, Trihalomethanes 2)	**25** (Trichloroacetic Acid 19, Dichloroacetic Acid 4, Trihalomethanes 2)	**25** (Trichloroacetic Acid 19, Dichloroacetic Acid 4, Trihalomethanes 2)
Coles Bay	**2** (Bromodichloromethane 2)		
Conara	**1** (Aluminium)		
Conglomerate Creek	**3** (Aluminium)		
Cornwall	**1** (Lead)	**2** (Lead)	**2** (Lead)
Currie	**1** (Trihalomethanes)	**6** (4 Trichloroacetic Acid, 2 Dichloroacetic Acid)	
Derby			**1** (Lead) [3]
Distillery Creek		**1** (Manganese)	**1** (Manganese) [2]
Epping	**1** (Aluminium)		
Exton	**1** (Aluminium)		
Fingal	**2** (Aluminium 1, lead 1)	**1** (lead)	**1** (lead)
Gawler River	**1** (Aluminium)		
Geeveston	**1** (Trichloroacetic Acid)	**1** (Trichloroacetic Acid)	**1** (Trichloroacetic Acid)
Kermandie			
Hamilton	**6** (Trichloroacetic Acid 4, Dichloroacetic Acid 2)	**6** (Trichloroacetic Acid 4, Dichloroacetic Acid 2)	**5** (Trichloroacetic Acid 3, Dichloroacetic Acid 2)
Herrick	**1** (Aluminium)		
Lady Baron	**3** (Aluminium)		
Leven River	**2** (Aluminium)		
Manuka River	**14** (Aluminium)		
Mathinna			**1** (Lead) [4]
National Park	**1** (Aluminium)		
Oatlands	**1** (Aluminium)		
Ouse	**7** (Trichloroacetic Acid 6, Dichloroacetic Acid 1)	**7** (Trichloroacetic Acid 6, Dichloroacetic Acid 1)	**7** (Trichloroacetic Acid 6, Dichloroacetic Acid 1)
Pioneer	**1** (Lead)	**1** (Lead)	**1** (Lead)
Ringarooma	**2** (Aluminium 1, Lead 1)	**1** (Lead)	**1** (Lead)
Rosebery	**24** (Aluminium 2, Lead 17, Dichloracetic Acid 4, Trichloroacetic Acid 1)	**21** (Lead, 15, Trichloroacetic Acid 2, Dichloroacetic Acid 4)	**21** (Lead, 15, Trichloroacetic Acid 2, Dichloroacetic Acid 4)
Rossarden			**1** (Lead)
Tullah	**17** (Aluminium)		

Tunbridge	**5** (Trihalomethanes 1, Bromodichloromethane 4)	**1** (Trihalomethanes)	**1** (Trihalomethanes)
Wayatinah	**1** (Trichloroacetic Acid)	**1** (Trichloroacetic Acid)	**1** (Trichloroacetic Acid)
Winnaleah	**3** (Aluminium 1, Lead 2)		**6** (Lead)
Zeehan	**1** (Aluminium)		

Notes
1..Tasmanian Department Health & Human Services *Drinking Water Quality Report* 2013-14 page 23

2. Refer *Tas Water Annual Drinking Water Quality Report* 2013-14 page 158 Distillery Creek 6.20.4 Analysis of Current Performance and Historic Trends

3. Refer *Tas Water Annual Drinking Water Quality Report* 2013-14 page 153 Derby 6.19.10 Analysis of Current Performance and Historic Trends

4. Refer *Tas Water Annual Drinking Water Quality Report* 2013-14 page 343 Mathinna 6.49.10 System Incidents and Issues

In May 2013 the Tasmanian Public Health and Environmental Health Network raised toxic metal issues in the National Media. It appears that little has changed, with the results in 2013-4 showing that 10 towns recorded heavy metals in their drinking water supplies and the issue at Rosebery significantly worsening.

"Spokesperson Isla MacGregor said "Rosebery is now the seventh town in Tasmania with drinking water supplies contaminated with toxic heavy metals. Five of the seven towns have been impacted on by local mines, Whitemark's and Ringarooma's water was sourced from areas near where mining has occurred."

The seven towns with drinking water supplies contaminated with lead are Whitemark, Pioneer, Ringarooma, Avoca, Royal George, Rosebery and Gormanston. Royal George's water is also contaminated with arsenic and cadmium and Avoca with cadmium also."

Aluminium

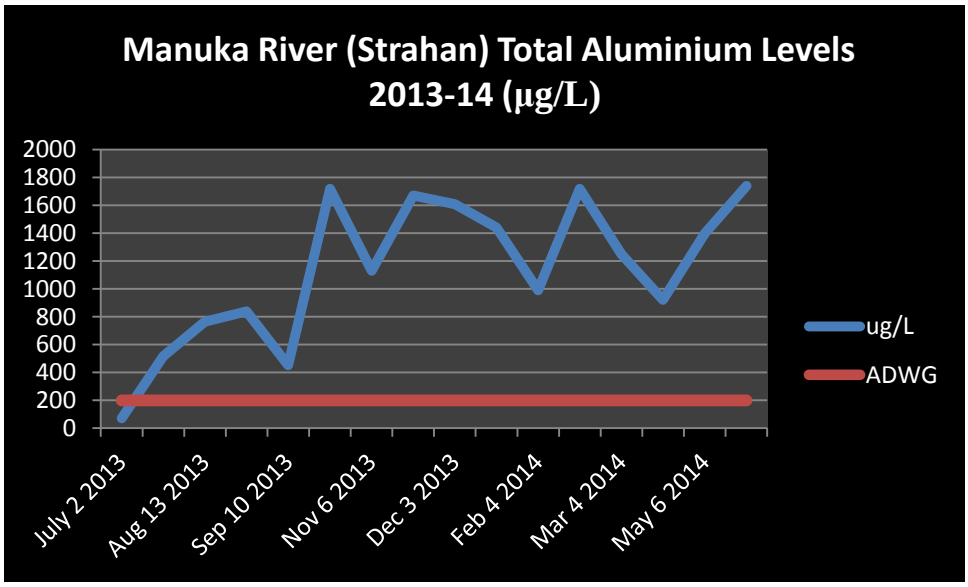
Aluminium: ADWG Aesthetic Guideline = 0.2mg/L (200µg/L)

FoE Suggested Health Guideline = 0.5mg/L (500µg/L)

Average Aluminium Detections 2013-2014, according to RTI (µg/L)	
Avoca	225.6
Bracknell	168.5
Cam River	158.03
Colebrook	160.5
Conara	339.25
Conglomerate Creek	468.24
Dover	324
Epping	340.25
Exton	379.5
Fingal	246.2
Gawler River	114.14
Geeveston-Dunolly	381.5
Herrick	380.43
Lady Baron	**820**
Leven River	317.95
Manuka River (Strahan)	**1139.75**
National Park	182.17
Oatlands	274
Ringarooma	194.6
Rosebery	154.7
Rossarden	180.2
Tullah	**775.4**
Winnaleah	273.9
Zeehan	135.28

**Footnote*
Aluminium: Friends of the Earth asserts that there were 54 other potential breaches for aluminium (in 20 communities), above a potential health guideline of 0.5mg/L. Currently, the ADWG only grant an aesthetic guideline for aluminium of 0.2mg/L. Recent research undertaken in the United Kingdom is associating aluminium with Alzheimer's disease, although there is debate about this is in the scientific community.

Highest Individual Aluminium Detections from RTI Data		
Water Supply	**Date**	
Conglomerate Creek (Queenstown)	**4/3/14**	**5240µg/L**
Pioneer	**3/6/14**	**1986.3µg/L (first version of RTI only)**
Manuka River (Strahan)	**3/6/14**	**1740µg/L**
Manuka River (Strahan)	**4/2/14**	**1720µg/L**
Manuka River (Strahan)	**8/10/14**	**1720µg/L**
Manuka River (Strahan)	**6/11/13**	**1670µg/L**
Manuka River (Strahan)	**6/5/13**	**1400µg/L**
Tullah	**6/11/13**	**1250µg/L**
Leven River (Penguin)	**6/5/14**	**1160µg/L**
Leven River (Penguin)	**10/6/14**	**1050µg/L**



According to the ADWG, no health guideline has been adopted for Aluminium, but that the issue is still open to review. Aluminium can come from natural geological sources or from the use of aluminium salts as coagulants in water treatment plants. According to the *ADWG "A well-operated water filtration plant (even using aluminium as a flocculant) can achieve aluminium concentrations in the finished water of less than 0.1 mg/L.*

The most common form of aluminium in water treatment plants is Aluminium Sulfate (Alum). Alum can be supplied as a bulk liquid or in granular form. It is used at water treatment plants as a coagulant to remove turbidity, microorganisms, organic matter and inorganic chemicals. If water is particularly dirty an Alum dose of as high as 500mg/L could occur. There is also concern that other metals may also exist in refined alum.

While the ADWG mentions that there is considerable evidence that Aluminium is neurotoxic and can pass the gut barrier to accumulate in the blood, leading to a condition called encephalopathy (dialysis dementia) and that Aluminium has been associated with Parkinsonism dementia and amyotrophic lateral sclerosis, the NHMRC, whilst also acknowledging studies which have linked Aluminium with

Alzheimer disease, has not granted Aluminium a NOEL (No Observable Effect Level) due to insufficient and contradictory data. Without a NOEL, a health guideline cannot be established. The NHMRC has also stated that if new information comes to hand, a health guideline may be established in the future.

In communication with Aluminium expert Dr Chris Exley (Professor in Bioinorganic Chemistry The Birchall Centre, Lennard-Jones Laboratories, Keele University, Staffordshire UK) in March 2013 regarding high levels of Aluminium detected in the South Western Victorian town of Hamilton

"It is my opinion that any value above 0.5 mg/L is totally unacceptable and a potential health risk. Where such values are maintained over days, weeks or even months, as indeed is indicated by the data you sent to me, these represent a significant health risk to all consumers. While consumers may not experience any short term health effects the result of longer term exposure to elevated levels of aluminium in potable waters ***may be a significant increase in the body burden of aluminium in these individuals. This artificially increased body burden will not return to 'normal' levels when the Al content of the potable water returns to normal but will act as a new platform level from which the Al body burden will continue to increase with age.***

While it is not my intention to scare anyone we had a problem in England in 1988 (Lowermoor Incident) where people were exposed to high levels of Al in their tap water over a number of weeks and it is only recently that we are seeing some of the consequences of this event with, for example, the recent death of a woman from a rare form of Alzheimer's disease which was attributed to a high level of Al in her brain...

To summarise, while the water authorities in Victoria may have good explanations as to why they failed to control the levels of Al in potable waters during these periods they should have warned the public not to drink or even use these waters until the contents of Al were back within the acceptable limits. Problems do happen when Al salts are used to clean potable waters. However, water companies need to act responsibly when they do happen and alert all users to the problem at the earliest possible time...."

Writing in 2011 Kawahara and Kato-Negishi state *[Link between Aluminum and the Pathogenesis of Alzheimer's Disease: The Integration of the Aluminum and Amyloid Cascade Hypotheses http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3056430/] "Recent studies using mass spectrometry of Al have demonstrated that small, but a considerable amount of Al crosses the blood brain barrier, enters into the brain, and accumulates in a semipermanent manner... Therefore, Al can cause severe health problems in particular populations, including infants, elderly people, and patients with impaired renal functions, and unnecessary exposure to Al should be avoided for such patients..."*

Bromodichloromethane (BDCM)

Trihalomethane (Chlorine Disinfection By-product)

BDCM: WHO Guideline = 0.06mg/L (60µg/L)

Average Bromodichloromethane Detections 2013-2014, according to RTI	
Tunbridge	74.5µg/L
Coles Bay	56.8µg/L

Bromodichloromethane (BDCM) is a chlorine disinfection by-product, and a component of Trihalomethanes (THM's). THM's consist of 4 chemicals: Chloroform, Bromoform, Dibromochloromethane and Bromodichloromethane (BDCM). The Australian Drinking Water Guidelines (ADWG) combine the four substances and then give a guideline level only for the sum of the four. That guideline for the four is 250 parts per billion. The WHO however give guidelines for each of the four substances, with the most toxic, BDCM given a safe drinking water guideline of **60 parts per billion (µg/L).** The guideline for all four THM's in the United States is 80 parts per billion).

The IARC (International Agency for Research on Cancer) has classified BDCM in Group 2B (possibly carcinogenic to humans). What this could indicate is that many other communities across Australia may have none or low numbers of breaches for THM's, yet could be consuming dangerous levels of individual DBP's and these results are not made public by water authorities. Some DBP's have been linked to bladder cancer and adverse reproductive outcomes.

Water authorities test for a handful of DBP's, yet 700 have been discovered. DBP's are created when chlorine used as a disinfectant, combines with organic molecules in the water distribution process. People are also exposed to DBP's through inhalation when swimming, showering in chlorinated water or by simply turning on a tap and breathing. This accumulated exposure is often ignored when setting standards for drinking water. DBP's can be higher first thing in the morning, due to overnight accumulation. It is common practice by water authorities to carry out testing on drinking water after first running taps for 3 minutes. Yet how many people leave a tap running for three minutes in the morning before pouring a glass of water, putting a jug on for tea or coffee and when having a shower? Health guidelines in Australia do not take into account exposure via inhalation or through the skin.

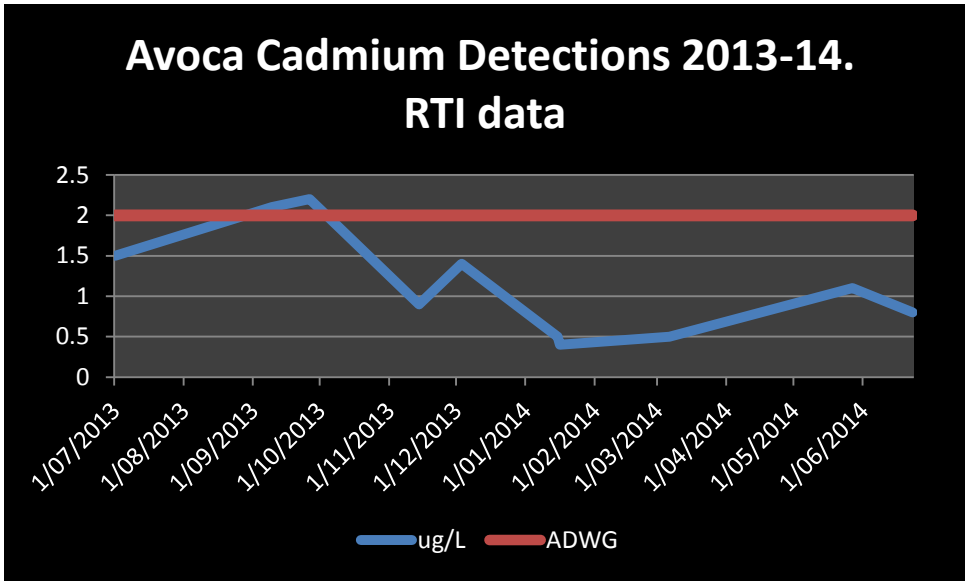
Cadmium

Cadmium: ADWG Guideline = 0.002mg/L (2µg/L)

The primary route of exposure of cadmium is via contaminated water or food. Fertiliser can be a source of excessive cadmium as can rainwater tanks. It has been linked to cancer, lung disorders, kidney disease and autoimmune disease.

Average Cadmium Levels 2013-14 µg/L			
Water Supply	**RTI**	**DHHS**	**Taswater Annual Report**
Avoca	**1.14**	**2.2**	**1.125**
Conara	**0.55**		**0.55**
Epping (Forest)	**0.675**		**0.675**

Cadmium was detected in several locations during the year, with the three highest supplies, being Avoca, Conara and Epping. During 2012-13 Avoca was on a TBWA alert. This was upgraded to a Public Health Alert due to excessive lead and cadmium in the water. PHA's effectively mean do not consume.



Lead

Lead: ADWG Guideline = 0.01mg/L (10µg/L)

Average Lead Detections 2013-2014 µg/L			
Water Supply	**RTI**	**DHHS**	**TasWater Annual Report**
Avoca	<6.8		0.92
Branxholme	1.35		1.35
Conara	1.175		1.17
Cornwall	18.78	74	18.78
Derby	0.84		0.74
Dowlings Creek	1.44		1.64
Epping Forest	1.625		1.63
Fingal	12.32	50	12.32
Geeveston-Kermandie	<0.05		1.25
Gladstone	3.6		0.9
Gormanston	4.4		4.4
Greater Hobart			0.88
Gretna	1		1
Herrick	1.76		1.76
Judbury	1		1
Lady Baron	3.03		3.03
Lake Barrington	<0.96		0.79
Ledgerwood	2.12		2.13
Mathinna	<0.75		3.03
Orford	<0.55		1.5
Pioneer	7.37	12	7.38
Ringarooma	3.58	14	3.58
Rosebery	<3.6	27	3.5
Rossarden	<1.44		1.35
Triabunna	0.65		1
Whitemark	1.73		1.73
Winnaleah	5.72		5.72
Zeehan	<1.09		

Three of TasWater's drinking water systems (Avoca, Pioneer and Whitemark) remain on PHAs due to elevated levels of lead. It is unclear why similar PHA's are not in place for Cornwall and Rosebery.

Unlike most water contaminants, lead gets into water after it leaves a water treatment plant. Often this contamination is the result of water treatment changes meant to improve water quality that end up altering the water chemistry, destabilising lead-bearing mineral scales that coat service lines and corroding lead solder, pipes, faucets and fixtures.

Image Source: http://ohioline.osu.edu/b910/b910_21.html

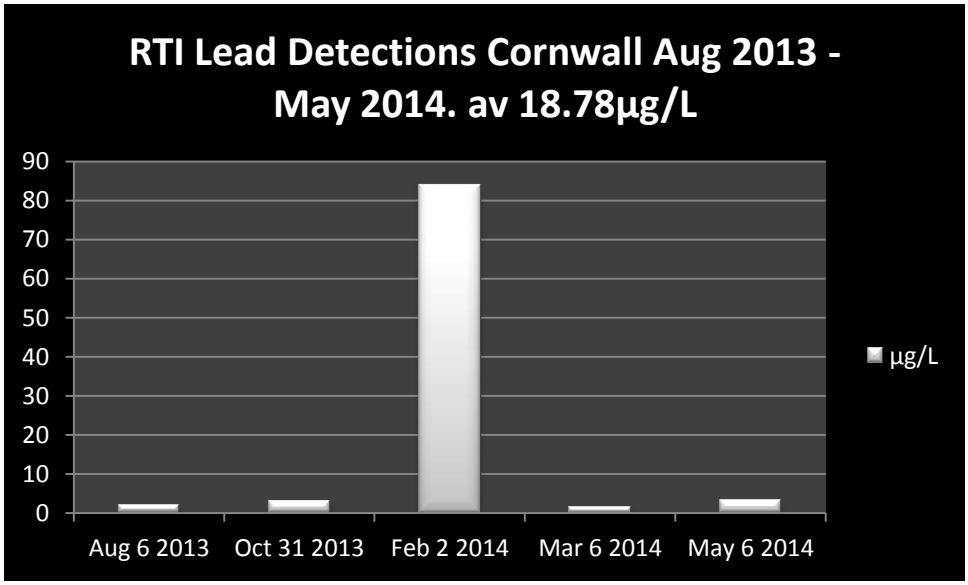
Lead in water has been seen to be a major source of lead exposure. Corrosion from lead based solders in brass fittings and copper pipes is often the source of lead in drinking water. This problem is often worsened by people drinking and cooking with corroded water after a first use particularly in the morning. Lead based solder has been banned in Australia since 1989 so problems are most likely to be associated in businesses and homes with water fittings pre-dating 1989. Lead has been linked to impaired cognitive development in children and a number of other health problems. (Lead can also be a result of dissolution from natural sources).

10 Highest Individual Lead Detections

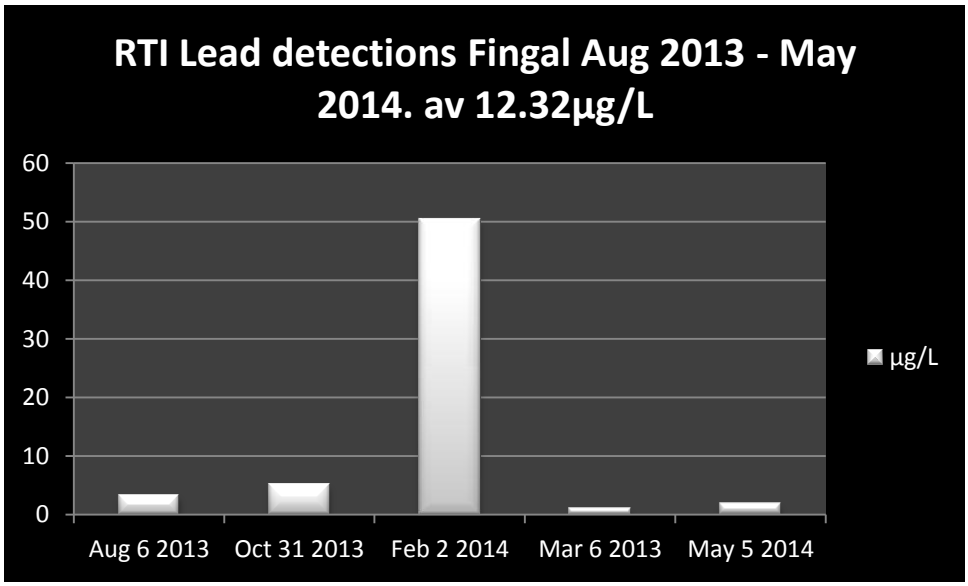
Supply	Date	Level	Information
Rosebery	5/8/13	182µg/L	Taswater/DHHS/RTI
Cornwall	12/2/14	83.9µg/L	Taswater/DHHS/RTI
Cornwall	8/5/14	64.4µg/L	Taswater
Avoca	14/11/13	59.9µg/L	Taswater
Fingal	12/2/14	50.3µg/L	Taswater
Rosebery	7/1/14	31.5µg/L	Taswater
Rosebery	22/10/13	27.6µg/L	Taswater
Rosebery	17/9/13	24.4µg/L	Taswater
Rosebery	26/11/13	15.6µg/L	Taswater
Rosebery	22/10/13	14.6µg/L	Taswater

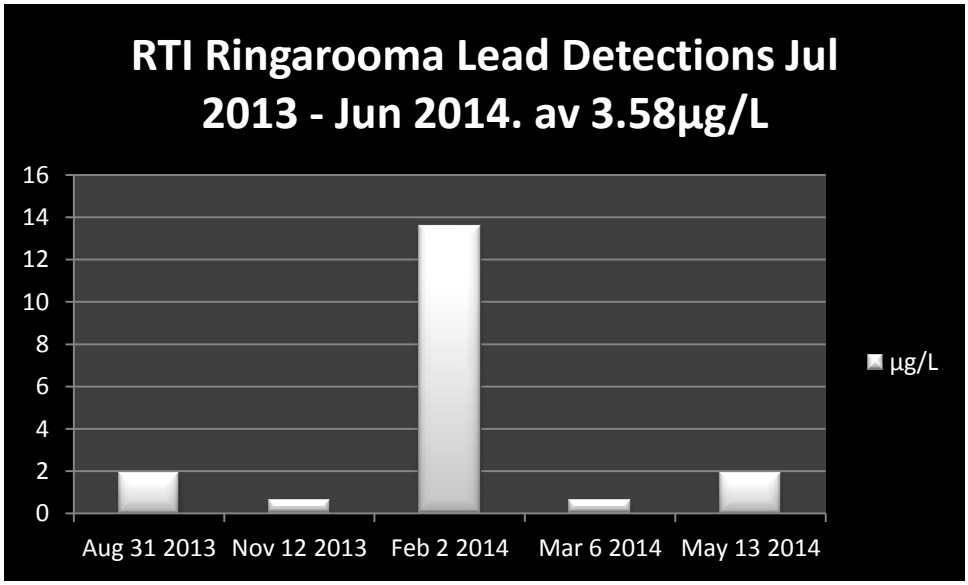
For some Tasmanian towns however current and past mining activities and local geology are likely to contribute to lead problems in drinking water. During 2013-14 Rosebery sourced their drinking water from a): the Stitt River (which is disinfected at Stirling Valley WTP) and b): filtered water from Mountain Creek. The TasWater data reveals that there are 6 sampling points in the town of Rosebery, yet only three sampling sites were provided in the RTI information. The Lead sample of 182µg/L (18.2 times over the ADWG) from the Stitt River, was sampled by DHHS in August 2013. Rosebery's

water supply is located in an uncovered storage, which may also be susceptible to airborne particulates. The intake for the Rosebery's drinking water is directly below the main drainage zone for the AMD (acid mine drainage) from the open cut at the mine. According to the TasWater Annual Report, of the 15 detections of lead above Australian drinking water guidelines at Rosebery 14 came from the Stitt River and 1 from Mountain Creek (The Taswater Annual Report which contradicts itself later by saying all detections were from the Stitt River). Cornwall gets their water from an, unnamed spring and the water is untreated. The intake for the system is a disused mine shaft. Avoca also suffers from past mining activities.



The RTI information revealed that the highest levels of lead detected in Tasmania [averaged out over the year] were in the community of Cornwall in the states north east. The high levels were caused by a spike in lead, >8 times the ADWG in February 2014. [Another reading of 64.4µg/L was recorded by TasWater in May 2014, but not presented in the RTI data]. The Fingal graph (below) is similar to that of Cornwall, possibly indicating environmental sources as the communities are located in close to each other (18km). Another closely located community Avoca, had a lead spike of 59.9µg/L in Nov 2013.





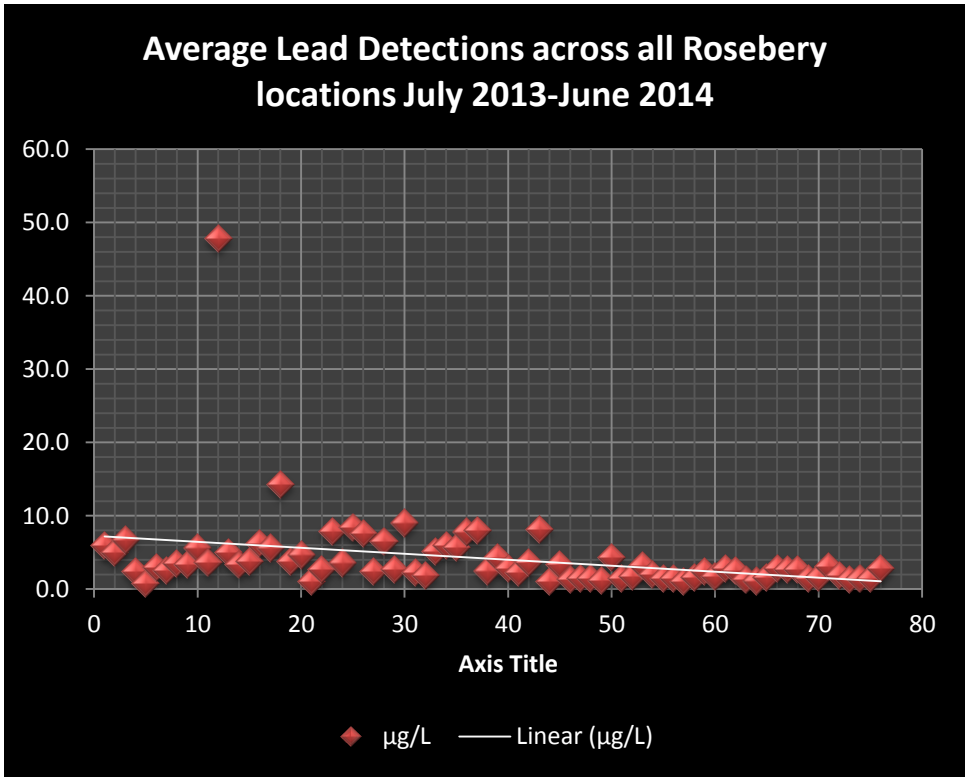
Ringarooma also recorded levels of lead above the ADWG in February 2014. RTI data showed that Ringarooma averaged 3.58µg/L over the year. DHHS tests averaged almost 4 times that amount, 14µg/L.

There are also grounds for concern that the pH level at Rosebery which is acidic may also be contributing to the lead problem by eroding away pipe solders which may contain lead. Any pH levels <7 can be quite corrosive to pipes and fittings. Rosebery's average pH for 2013-14 was 6.75. This raises the question of why TasWater are allowing the pH levels of drinking water at Rosebery to remain acidic, when this could be contributing to the lead problem.

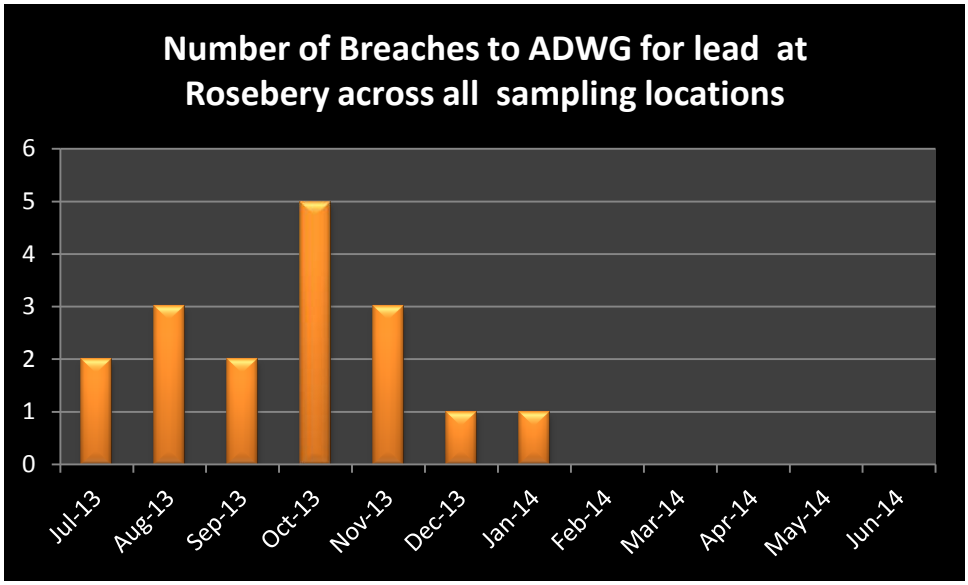
Australian Drinking Water Guidelines Breaches for Lead Rosebery July 2013 – June 2014

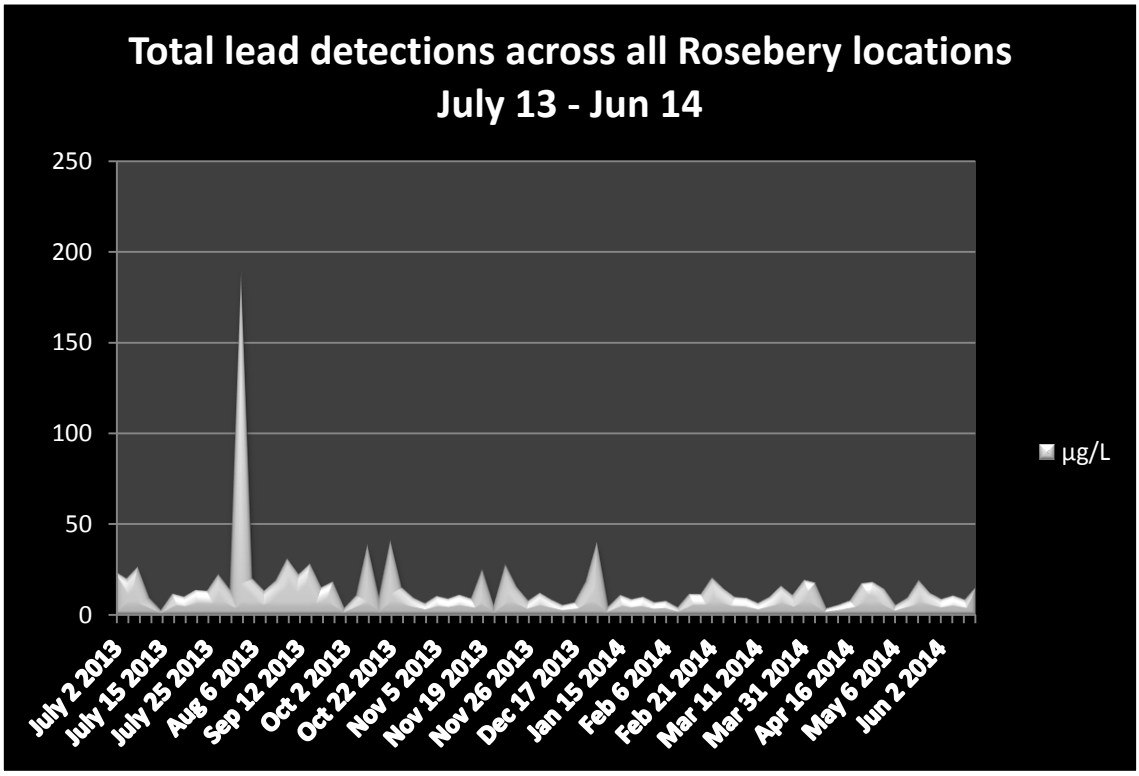
		µg/L
Howard Street	August 5 2013	182
Huon Crt Hydrant	January 7 2014	31.5
Blackwood St	October 22 2013	27.6
Blackwood St	October 22 2013	25
Huon Crt Hydrant	September 17 2013	24.4
Blackwood St	November 26 2013	15.6
Blackwood St	September 10 2013	15.1
Huon Crt Hydrant	October 22 2013	14.6
Blackwood St	November 26 2013	14
Howard Street	July 30 2013	13
Rear of Hospital	May 4 2015*	12
Huon Crt Hydrant	October 8 2013	11.3
Huon Crt Hydrant	October 22 2013	11
Huon Crt Hydrant	November 26 2013	10.6
Howard Street	August 6 2013	10.2
Howard Street	August 21 2013	10.2
Blackwood St	January 7 2014	10.2
Murchison Hwy	July 2 2013	10

Longest Periods of time for Excessive Lead levels Rosebery July 2013 – June 2014			
Howard St	**July 30 2013 – Sep 12 2013**	**46 days**	**31.1µg/L**
Blackwood Street	**Sep 10 – Oct 22 2013**	**42 days**	**14µg/L**
Huon Crt Hydrant	**Sep 17 – Jan 7 2014**	**112 days**	**8.9µg/L**



By June 2014, average lead levels across all sites at Rosebery were dropping from the higher levels in 2013. Breaches to the ADWG lead levels also dropped off considerably in 2014. It should be pointed out that lead levels in drinking water may well have been higher than those recorded by TasWater, because before testing water is usually left to run for a couple of minutes. This practice can lower the build up of lead and other contaminants in pipes, however how many residents let their taps run for several minutes before having a cup of tea or glass of water?





Although total lead levels were dropping as an average level across Rosebery it is still apparent that lead pollution was still occurring by mid 2014.

Rough location guide for Rosebery showing average levels of lead detected between July 2013 - June 2014. Note higher levels in north west of town. Huon Crt averaged 2.9µg/L, Blackwood Street 4.3µg/L, Howard St 5.6µg/L. Rear of hospital samples were taken between Jan 2014 and June 2015 and averaged 2µg/L.

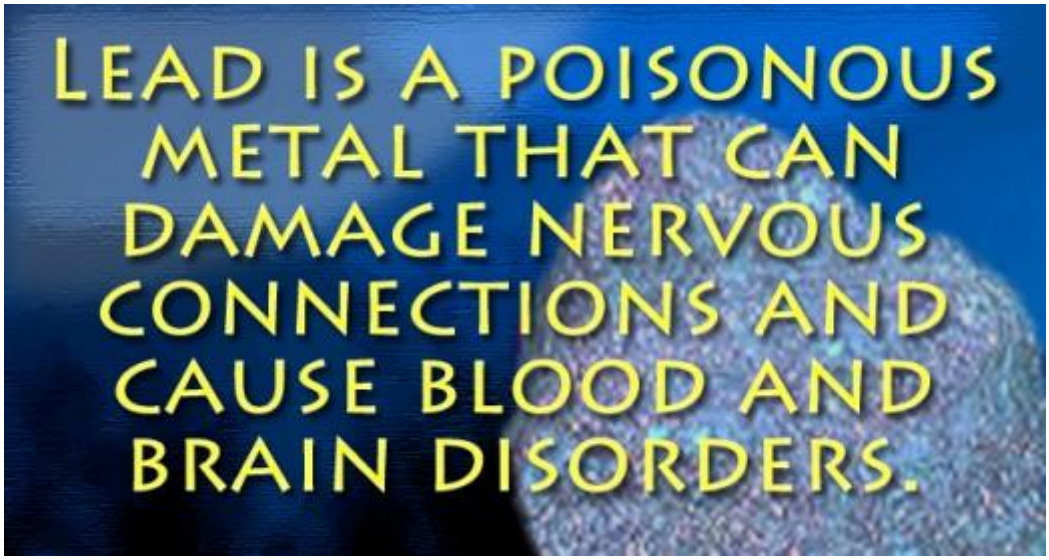
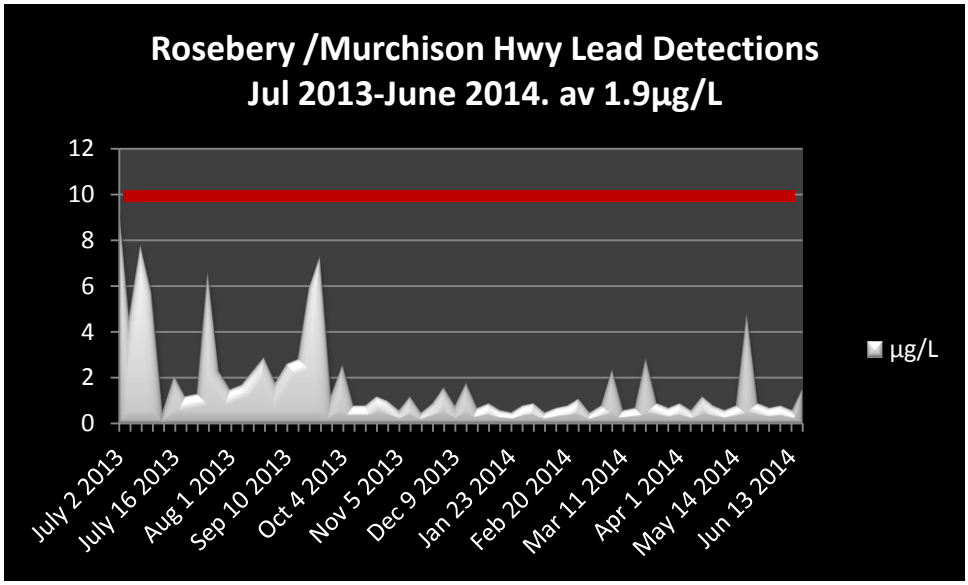
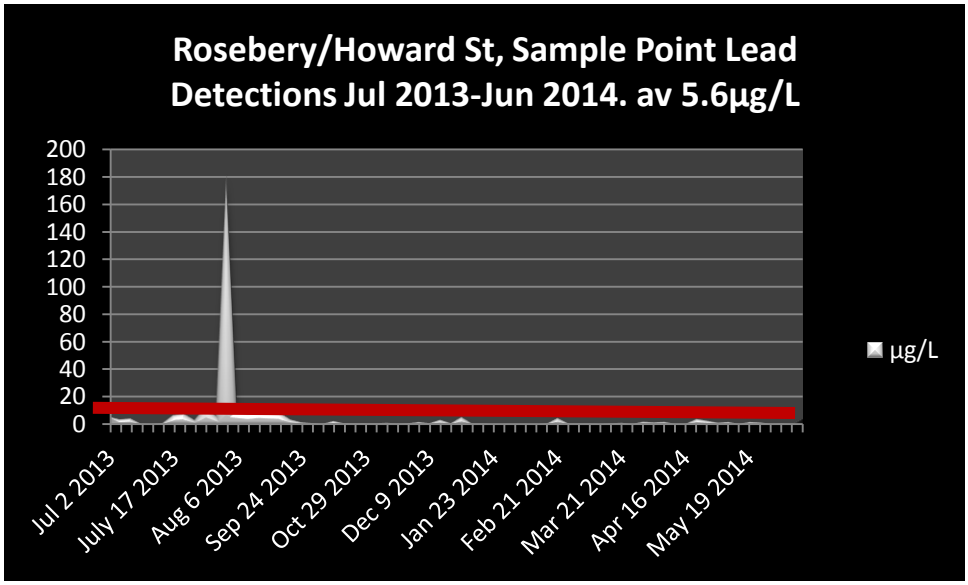


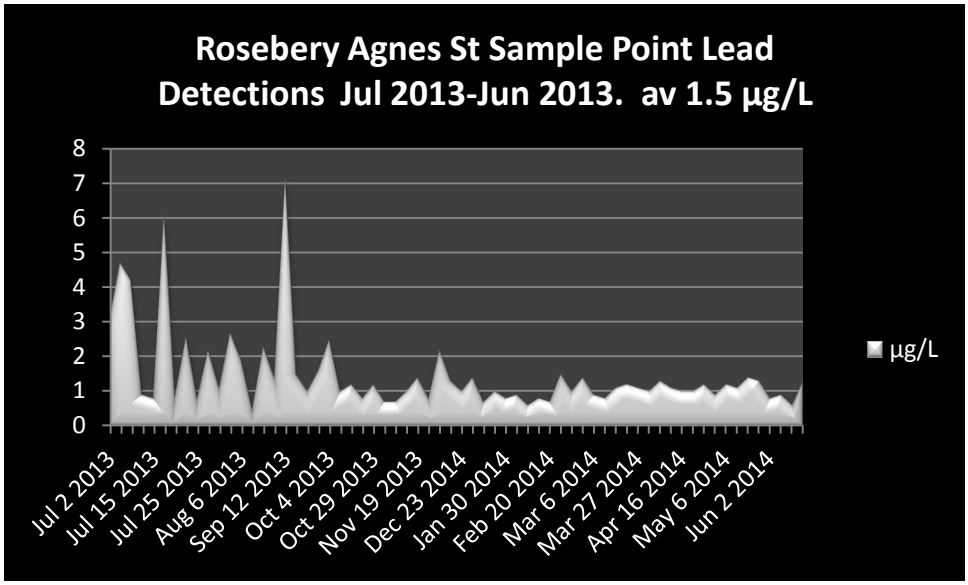
Image Source: ***http://debbybruck.hubpages.com/hub/Homeopathy-Lead-Effects-Brain-Function-and-Criminal-Behavior#***



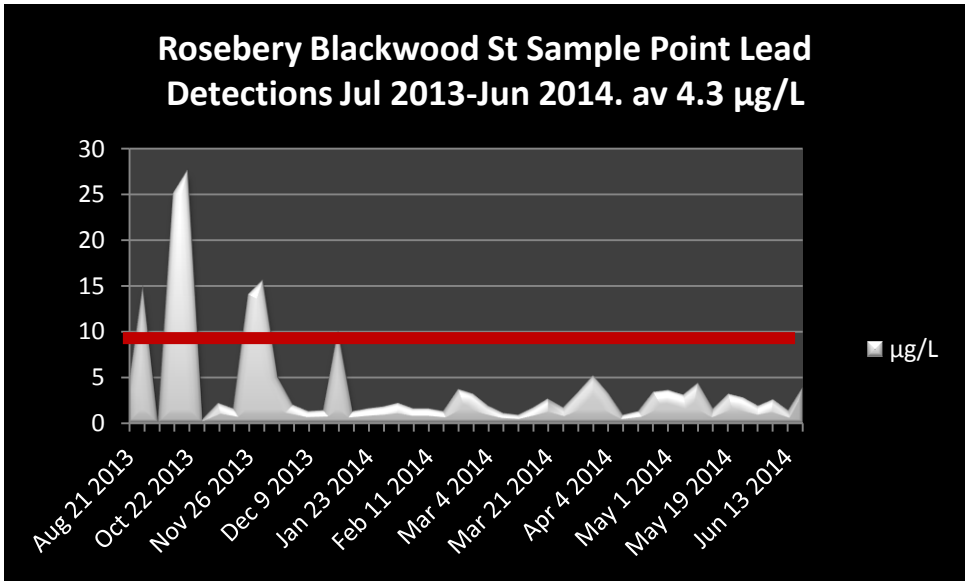
All lead detections (except one) at this location were below the Australian Drinking Water Guidelines, however quite high levels were recorded between June and October 2013.



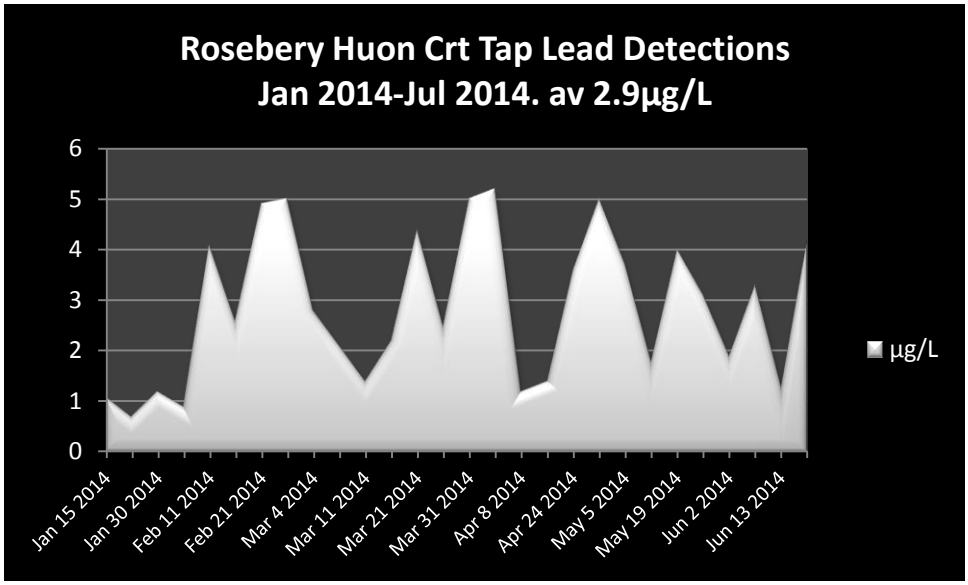
The most notable issue at Howard Street, was the enormous spike in lead detected on August 5 2012. 182µg/L. Why was this not reported in the Tasmanian media? Lead averaged three times higher than the ADWG for over a month during August/September 2013.



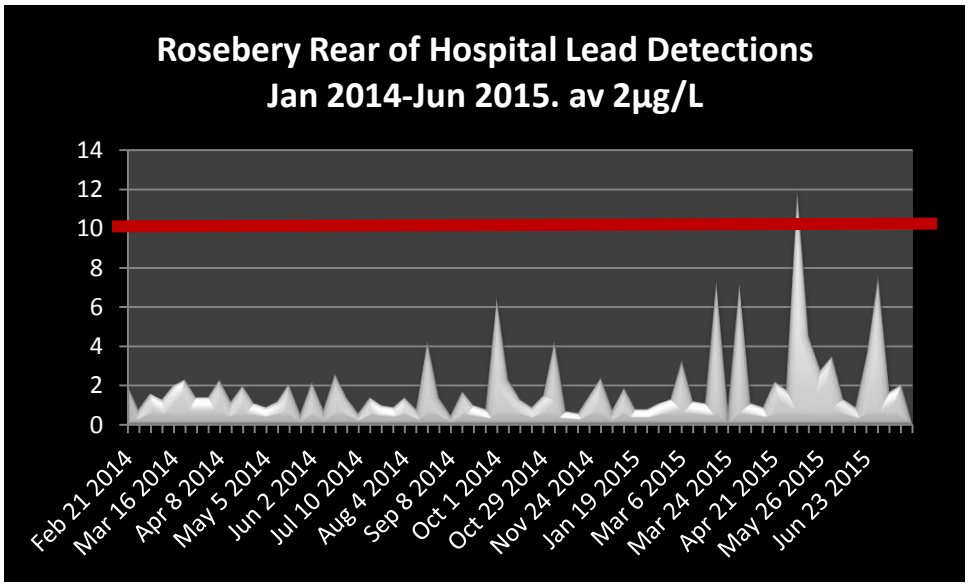
Higher levels again detected in late 2013, in comparison to lower levels in 2014.



Obvious problems at this location between September and January 2014, with the highest spike occurring on October 22 2013, almost three months after the enormous spike at nearby Howard Street. [Note due to formatting problems, red line should be located on 10µg/L line].



Consistent levels recorded at this location during testing between January and June 2014.



The final RTI information for Rosebery included information from a site near the rear of Rosebery Hospital. This information included data for 2015. At this location the highest lead levels were being recorded between March and June 2015. It is obvious from this information that the lead issue at Rosebery continues to be a problem.

Image Source: ***http://serc.carleton.edu/NAGTWorkshops/health/case_studies/lead.html***

The Stitt River is the key contributor to the lead problem at Rosebery.

"15 detections of lead above the ADWG health limits were recorded during the reporting period. ***All 15 detections were from the Stitt River****. Sampling was increased to weekly to monitor and quantify risk."*

"Metals sampling in the Rosebery system is currently conducted weekly as there has been detections of lead above ADWG health limits. ***During this reporting period 15 samples exceeded the ADWG health limit for lead; the maximum detection was 182 µg/L on the 5/8/2013 which originated from the Stitt River system.***

TasWater established a weekly scouring program to mitigate the risk associated to lead bound sediment. In addition, a full network scour of the Dalmeny Estate was conducted in January 2014." Source: TasWater Annual Drinking Water Quality Report 2013–14

It is also highly likely that the source of the pollution is from contaminated mining waters under the control of MMG Limited, a company largely owned by China Minmetals Corporation. MMG Limited own an underground polymetallic base metal (zinc, lead, copper, gold) mine in the town.

The pollution has been well documented by the Toxic Heavy Metals Taskforce who were raising alarm bells regarding detections of lead several years ago . There was one lead detection in August 2013 of 182ug/L at Rosebery (The highest levels recorded in Australia could be that of Pioneer Tasmania: 1.69mg/L lead and Whitemark 1mg/L during 2012/13). See 2012-13 DHHS Drinking Water Report

Toxic Heavy Metals Taskforce (December 2013)
http://www.mininglegacies.org/wp-content/uploads/2012/12/Rosebery-Mine_article.pdf

The numerical modelling suggested that the potential area of discharge for contaminated mine waters is far more limited in extent than was previously believed by mine personnel. This area is limited to: (i) areas along the Stitt River and Rosebery Creeks, which are already experiencing significant acid mine drainage contamination; and (ii) a very limited area south and north of the Pieman River's confluence with the Stitt River. ... Along with the mine adit, Rosebery Creek and the Stitt River have been identified as the most significant potential long term, high volume, and high contaminant groundwater discharge locations within the catchment...

MMG had 5 concentrate spills from Feb to May 2013. "*The leaking water meter is in the same area of Rosebery where high Lead levels have been found in the drinking water supply and not far from the Filter Plant where 5 concentrate spills from MMG's pipelines have occurred between February and May this year alone. A spill on the 17th March was a level 3 spill from the lead/copper return pipe and for some unknown reason the EPA is still investigating this incident seven months later. MMG Rosebery Mine put in an objection to DPIPWE over a Right To Information request that the Taskforce submitted several months ago about investigations into drinking water contamination in Rosebery ...*

Image Source: http://serc.carleton.edu/NAGTWorkshops/health/case_studies/lead.html

"RTI documents show high Lead levels not acted on in 2011 RTI documents have revealed that high Lead levels were first discovered in monthly samples taken from the drinking water supply in 2011 - levels found were 11.3ug/L in May and 17.3ug/L in June.

In 2011 the Director of Health Dr Roscoe Taylor failed to warn residents of Rosebery of these two consecutive Lead levels that breached Australian Drinking Water Guidelines".

The Health Department only took action on Lead contamination of the water supply this year and commenced a new round of weekly testing in April. Just how long people have been drinking water poisoned with Lead in Rosebery will never be known.
The Australian Drinking Water Guideline for Lead is 10ug/L and the highest Pb levels found in samples in Rosebery taken on 21 May, 2013 were:
Howard Street - Pb 53.1 and at Sassafras Street - Pb 49.9 and at Huon Street - Pb 18.7.

TasWater no priority to cover water tanks
Our Taskforce were shocked that Mike Brewster from TasWater told ABC7.30 Report on Friday night that it is not a priority to put a cover on the Mount Black Reservoir which would prevent contamination from the mine's toxic emissions". Source: http://www.mininglegacies.org/wp-content/uploads/2012/12/Rosebery-Mine_article.pdf

Tas Water announced in October 2014 that new works had begun in Rosebery for water and sewerage upgrades. A new $3.3 million water treatment plant, roofing of the existing reservoir and anew treated

water reservoir will be constructed. Construction is expected to begin in the 2nd half of 2015. It will be interesting to see if the new treatment plant solves the lead problem.

Elsewhere in Australia?

Sometimes it is useful to put the Tasmanian lead pollution issue in context with what is occurring in other water supplies across Australia. The following information on lead was published by Friends of the Earth in February 2012, in an Introduction to Australian Drinking Water Issues. *Source: http://www.foe.org.au/sites/default/files/FoeADrinkingWaterQualityProject2012_0.pdf*

"Further studies conducted in Perth (WA) in 1993 on cold water from kitchen taps have indicated that 5% of samples were above the acceptable lead level as defined by the National Health and Medical Research Council (NHMRC), 2% were above the limit for cadmium and 12% above the limit for copper...." Source: http://www.lead.org.au/lanv8n1/l8v1-11.html

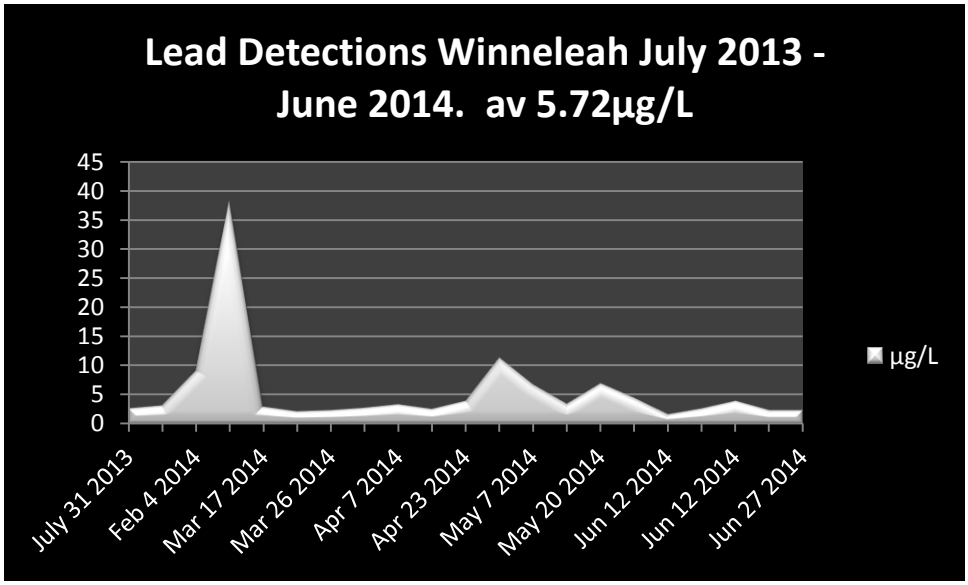
The highest recorded level in Australia in recent years was recorded in South Australia
"In Mannahill, their highest reading was 0.104mg/L, more than 10 times the recommended safe level..." Source: http://www.theflindersnews.com.au/news/local/news/general/contaminated-water-issue-to-be-investigated/2480332.aspx

"The highest level recorded by SA Water 2000-12: Port Neill 0.03mg/L 18/9/00. The highest recorded level 2005-11 in Victoria was recorded in the south western Victorian community of Koroit 0.094mg/L. (Wannon Water 2006/7). The highest Melbourne level was recorded in the eastern suburbs of Melbourne at Mitcham 2007/8 at 0.028mg/L".

"During December 2006 - March 2007, people in Esperance, Western Australia, noticed a significant number of bird deaths in the area. Tests later revealed their bodies contained high levels of lead. The highest level recorded in the Northern Territory in 2010 was 0.055mg/L at Kaltukatjura (Docker River) 2010."

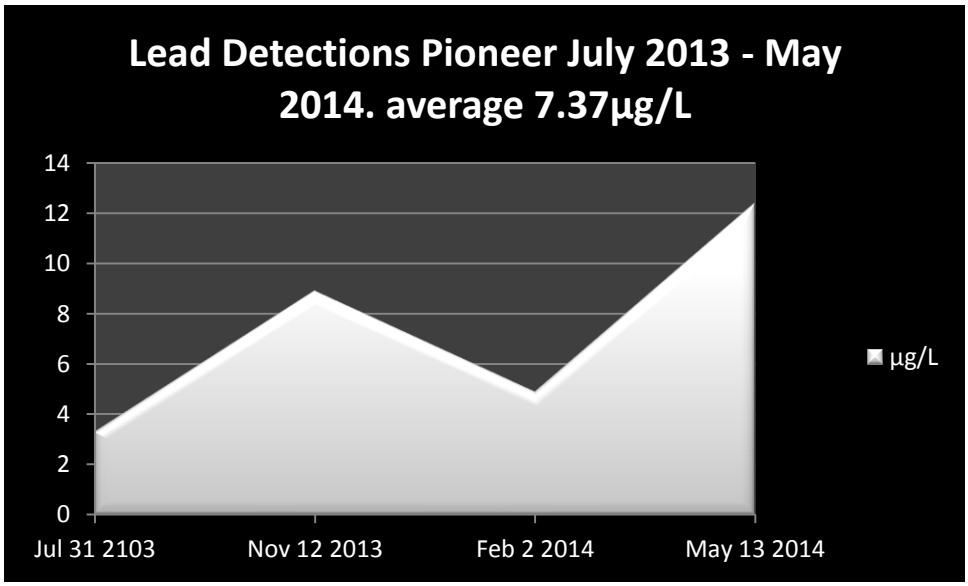
"Esperance Rainwater Samples 2007: Highest Lead Reading 0.68mg/L (27% of samples above ADWG) Source: http://www.dec.wa.gov.au/content/view/3484/1729/

"Sampling and testing by DEC and the Department of Health (DoH) found that some rainwater tanks in Esperance had lead and nickel levels exceeding Australian Drinking Water Guidelines and a number of residents had elevated lead levels in their blood. With lead and nickel found in the soil, air, dust and/or rainwater in Esperance, concerns were raised that people and animals spending time in Esperance might be exposed to unacceptable health risks. The shipping of lead through Esperance Port was stopped in March 2007 and a stockpile of lead carbonate was quarantined until a safe removal plan could be agreed upon." Source: http://www.dec.wa.gov.au/content/view/3484/1729/



The RTI data reveals that Lead continued to be a problem in the small community of Winneleah, particularly around February/March in 2014. So serious was the problem that an alternative water supply option was provided. According to a story nationally aired by the 7.30 Report:
http://www.abc.net.au/7.30/content/2015/s4222652.htm

"After testing 179 water, rock and soil samples, they've found the source water is clean and the lead contamination is coming from old pipes, infrastructure and the household plumbing. MARK TAYLOR: The natural catchment waters are not contaminating the drinking water supply. That contamination is coming from the infrastructure that is in the town and in people's homes. MICHAEL ATKIN: The most alarming finding is lead levels inside houses in Pioneer are 22 times above the safe drinking standard. MARK TAYLOR: It's pretty clear that these numbers that we can see coming out of people's taps are the worst that we've seen in Australia.



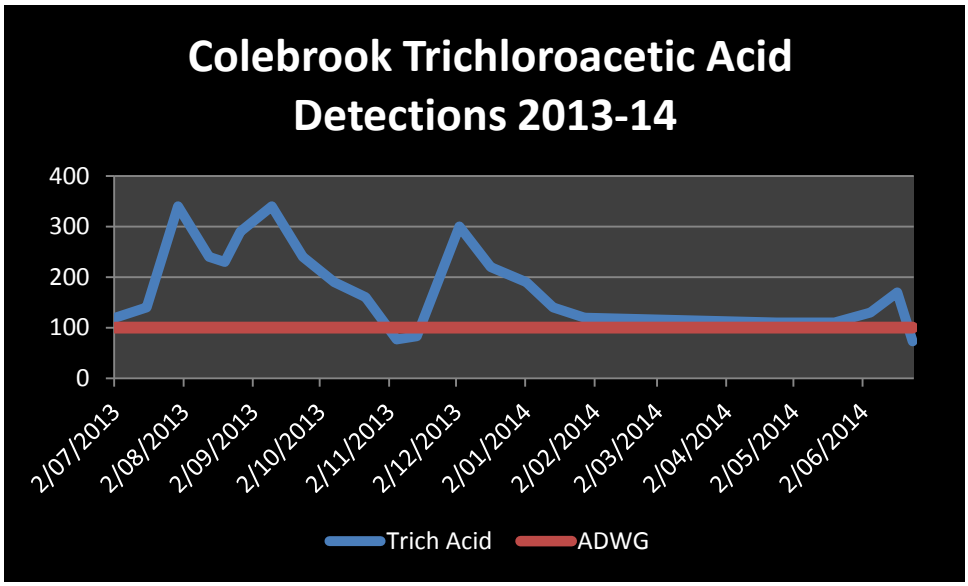
Oddly enough these massively high lead levels detected at Pioneer were not reflected in the data provided by the TasWater RTI. It is also strange that Rosebery had recorded a level of lead 5 times higher than that of Winneleah, in August 2013, yet a similar focus on Rosebery's lead crisis avoided media scrutiny.

Trichloroacetic Acid

Haloacetic Acid (Chlorine Disinfection By-product)

Trichloroacetic Acid: ADWG Guideline = 0.1mg/L (100µg/L)

Average Trichloroacetic Acid Detections 2013-2014 µg/L			
	RTI	DHHS	TasWater Annual Report
Colebrook	158.71	199	158.7
Currie		163	
Geeveston-Kermandie	52.77	170	
Hamilton	88.92	163	88.92
Ouse	106.58	153	106.5
Rosebery		105	
Wayatinah	55.83	110	55.83



"Chloroacetic acids are produced in drinking water as by-products of the reaction between chlorine and naturally occurring humic and fulvic acids. Concentrations reported overseas range up to 0.16mg/L and are typically about half the chloroform concentration.
The chloroacetic acids are used commercially as reagents or intermediates in the preparation of a wide variety of chemicals. Monochloroacetic acid can be used as a pre-emergent herbicide, dichloroacetic acid as an ingredient in some pharmaceutical products, and trichloroacetic acid as a herbicide, soil sterilant and antiseptic." *Australian Drinking Water Guidelines – National Health and Medical Research Council*

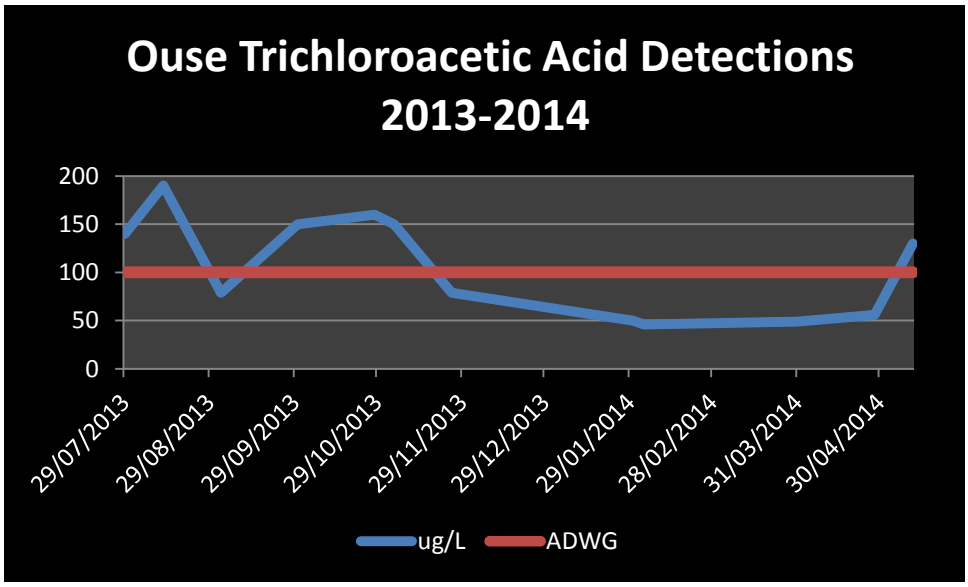
"HAAs are formed in drinking water when chlorine disinfectants used in water treatment react with organic matter (e.g., humic or fulvic acids) and inorganic matter (e.g., bromide ion) naturally present in the raw water (IPCS, 2000). HAAs are the second most frequently occurring DBPs, after THMs...

HAA formation can be appreciable when drinking water is chlorinated under conditions of slightly acid pH (IPCS, 2000). Whereas THM formation increases with increasing pH, HAA formation decreases, hydrolysis likely being a significant factor (Krasner et al., 1989; Pourmoghaddas and Stevens, 1995). Despite the fact that HAAs and THMs have different pH dependencies, their formation appears to correlate strongly when treatment conditions are relatively uniform and when the water has a low bromide concentration (Singer, 1993)."
Source: http://www.hc-sc.gc.ca/ewh-semt/pubs/water-eau/haloaceti/index-eng.php

Haloacetic acids (HAA's) are also Chlorine disinfection by-products (DBP's). 15 HAA's can be formed in the presence of chlorine, bromide and iodide. The most common HAA's are dichloroacetic acid and trichloroacetic acid. Other HAA's include: bromochloroacetic acid, bromodichloroacetic acid, dibromoacetic acid, monochloroacetic acid, monobromoacetic acid, bromoacetic acid and chloroacetic acid.

There is no overall guideline for Haloacetic Acids in Australia, only singular guidelines for Chloroacetic Acid, Dichloroacetic Acid and Trichloracetic Acid. Other countries such as Canada 0.08mg/L and the United States 0.06mg/L have combined Haloacetic Guideline levels.

According to the ADWG: *"Based on health considerations, the concentrations of chloroacetic acids in drinking water should not exceed the following values:*
Chloroacetic acid 0.15 mg/L
Dichloroacetic acid 0.1 mg/L
Trichloroacetic acid 0.1 m g/L"



"...Accordingly, this assessment concludes that there is suggestive evidence of carcinogenic Potential for TCA. ... Because TCA is highly soluble in water, it is reasonable to assume that TCA can be absorbed and taken up into the blood via the inhalation route. Moreover, the drinking water studies demonstrate that TCA acts systemically rather than only at the site of first contact. In the absence of information to indicate otherwise, there is suggestive evidence of carcinogenic potential

for TCA by all routes of exposure...In this case, although there are no epidemiologic studies that have evaluated the carcinogenicity in humans, the carcinogenicity of TCA has been evaluated in several studies in both rats and mice. These studies are well-conducted studies showing evidence of increased incidence of tumors in both sexes of one species at multiple exposure levels. The data from these studies are adequate to support a quantitative cancer dose-response assessment.

Considering these data and uncertainty associated with the suggestive nature of the tumorigenic response, EPA concluded that quantitative analyses may be useful for providing a sense of the magnitude of potential carcinogenic risk. Based on the weight of evidence, a dose-response assessment of the carcinogenicity of TCA is deemed appropriate....

There are no epidemiological studies of TCA carcinogenicity in humans. Most of the human health data for chlorinated acetic acids concern components of complex mixtures of water disinfectant by-products. These complex mixtures of disinfectant by-products have been associated with increased potential for bladder, rectal, and colon cancer in humans [reviewed by Boorman et al. (1999); Mills et al. (1998)]." *Ref: tmp/Trichloroacetic acid (TCA) CASRN 76-03-9 IRIS US EPA.htm*

Dichloroacetic Acid

Haloacetic Acid (Chlorine Disinfection By-product)

Dichloroacetic Acid: ADWG Guideline = 0.1mg/L (100µg/L)

Average Dichloroacetic Acid Detections 2013-2014 µg/L			
	RTI	DHHS	TasWater Annual Report
Colebrook	<51.81	133	51.6
Currie		115	
Hamilton	<39.82	100	39.46
Ouse	40.67	120	40.6
Rosebery	33.33	150	32.72
Wayatinah			30.5

"Dichloroacetic Acid (DCA) is considered to be a probable carcinogen to humans, based on sufficient evidence in animals and inadequate evidence in humans. Animal studies have shown links between exposure to DCA and liver tumours in both mice and rats. A health-based target concentration of 0.01 mg/L can be calculated for DCA in drinking water...

Some animal studies suggest a possible link between developmental effects (heart defects) and exposure to DCA or (Trichloroacetic Acid) TCA, whereas other studies fail to show a link. Animal studies also suggest a possible link between male reproductive effects (on sperm and sperm formation) and exposure to DCA or DBA, at levels significantly higher than those found in drinking water. Further studies are required to confirm these effects as well as their long-term significance to human health.

A single guideline for total haloacetic acids is established, based on the health effects of the individual haloacetic acids, and taking into consideration both treatment technology and the ability of treatment plants, particularly smaller ones, to achieve the guideline. The guideline is considered to be protective of health for all haloacetic acids, based on the ratio of haloacetic acids expected to be found in drinking water. The guideline value is primarily designed to be protective of the health effects of DCA, the haloacetic acid that would pose the most significant health concerns and is found at the highest levels in drinking water." *Source: Guidelines for Canadian Drinking Water Quality: Guideline Technical Document - Haloacetic Acids*

"...DCA is classified in Group II (probably carcinogenic to humans), based on sufficient evidence in animals and inadequate evidence in humans. A health-based target concentration of 0.01 mg/L can be calculated for DCA in drinking water, based on liver tumours observed in both mice and rats. TCA is classified in Group III (possibly carcinogenic to humans), based on limited evidence of carcinogenicity in experimental animals and inadequate evidence in humans. A health-based target concentration of 0.3 mg/L can be calculated for TCA in drinking water. Although animal studies have

shown a link between exposure to TCA and liver tumours in mice only, it is still uncertain whether the mechanism causing these tumours is relevant to humans. ....". Source: Guidelines for Canadian Drinking Water Quality: Guideline Technical Document - Haloacetic Acids

Trihalomethanes

Chlorine Disinfection Byproduct

THM's: ADWG Guideline = 0.25mg/L (250µg/L)

Average THM Detections 2013-2014 µg/L			
	RTI	DHHS	TasWater Annual Report
Colebrook	250	310	250
Currie	152.22		
Ouse	158.25		158.2
Tunbridge	230	260	230

Classical trihalomethanes consist of chloroform (CHCl3), dichlorobromoform (CHCl2Br), dibromochloroform (CHBr2Cl) and bromoform (CHBr3).

Why and how are THMs formed?
"When chlorine is added to water with organic material, such as algae, river weeds, and decaying leaves, THMs are formed. Residual chlorine molecules react with this harmless organic material to form a group of chlorinated chemical compounds, THMs. They are tasteless and odourless, but harmful and potentially toxic. The quantity of by-products formed is determined by several factors, such as the amount and type of organic material present in water, temperature, pH, chlorine dosage, contact time available for chlorine, and bromide concentration in the water. The organic matter in water mainly consists of a) humic substance, which is the organic portion of soil that remains after prolonged microbial decomposition formed by the decay of leaves, wood, and other vegetable matter; and b) fulvic acid, which is a water soluble substance of low molecular weight that is derived from humus". Source: http://water.epa.gov/drink/contaminants/index.cfm

"...Increase in bromide ion concentration increases total THM formation. Fractions of brominated THMs decrease with increasing NOM molecular size. Lower molecular weight NOM forms more brominated THMs than the corresponding higher molecular weight NOM. Increase of bromide to chlorine ratio decreases chloroform and increases brominated THMs. Increase in pH increases chloroform and decreases brominated THMs. This study demonstrates that the distribution of NOM and bromide ion can have important role on the distribution of THMs....distribution of lower and higher molecular weight NOM, can influence THM formation..." Source: Trihalomethanes in drinking water: Effect of natural organic matter distribution Water SA Vol. 39 No. 1 January 2013)

"**What are the health effects of THMs?**

According to a University of Florida report, exposure to THMs may pose an increased risk of cancer. According to Rebekah Grossman, two THMs, chloroform and dibromochloromethane, are carcinogens; and another THM, bromodichloromethane, has been identified as a mutagen, which alters DNA. Mutagens are considered to affect the genetics of future generations in addition to being carcinogenic. A California study indicates that THMs may be responsible for reproductive problems and miscarriage. The study found a miscarriage rate of 15.7 percent for women who drank five or more glasses of cold water

containing more than 0.075 mg/l TTHM, compared to a miscarriage rate of 9.5 percent for women with low TTHM exposure. In addition to these risks, TTHMs are linked to bladder cancer, heart, lungs, kidney, liver, and central nervous system damage."
Source: http://water.epa.gov/drink/contaminants/index.cfm

According to the Australian Drinking Water Guidelines. *"The World Health Organization (WHO) has derived separate guideline values for each compound, but in doing so recognises that the compounds have similar toxicological action. The WHO guideline values for chloroform (0.2 mg/L)and bromodichloromethane (0.06 mg/L) were based on calculations that estimated additional lifetime risks of one fatal cancer per 100,000 people. The use of this approach is questionable because there is evidence that tumours do not occur at low concentrations.... The WHO guideline values for bromoform (0.1 mg/L) and dibromochloromethane (0.1 mg/L) were based on different studies and safety factors from those recommended by the NHMRC Standing Committee on Toxicity, although toxicological effects were similar."* *Source: Australian Drinking Water Guidelines – National Health and Medical Research Centre.*

Pesticides and Benzene

The TasWater Annual Drinking Water Report 2013-14 shows that pesticides were detected at levels lower than the Australian Drinking Water Guidelines at: Bothwell, Deloraine, Bridport, Longford, South Esk, Tunbridge and West Tamar. However the pesticide results contained in the RTI information differed quite significantly from that published in the TasWater Annual Drinking Water Quality Report 2013-14. One of the biggest difference was in regards to Currie, where the RTI data revealed contamination of the local water supply by trace levels of three pesticides (Chlorothalonil , Glyphosate ,Alpha-Cypermethrin) and the organic chemical benzene (a known carcinogen).

The DHHS Drinking Water Quality Report for 2013-14 makes no mention of any pesticide or benzene being detected in Tasmanian waterways. This is probably due to the fact that Health Departments have little interest in substances that are not above relevant health guidelines.

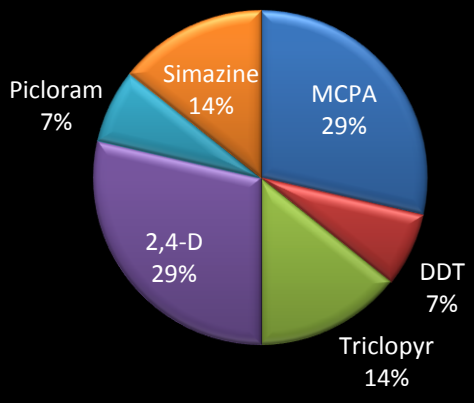
The detection of benzene probably indicates that the groundwater supply at Currie is possibly contaminated from leaking fuel storage tanks. The highest benzene detection is at 30% of the ADWG 0.001mg/L (1ug/L). The International Agency for Research on Cancer have concluded that Benzene is a Group 1 Sufficient evidence of carcinogenicity in humans.

The highest level of pesticide when comparing levels against the ADWG is the Triclopyr detection at Deloraine on 17/12/13. The detected level comes in at 10.35% of the ADWG.

Pesticide Detections 2013-14 µg/L

	Taswater Annual Drinking Water Report		RTI Request	
Supply	**Date**	**Pesticide Detection**	**Date**	**Pesticide Detection**
Bothwell	25/7/13	MCPA 0.1	30/7/13	MCPA 0.09
		DDT	30/7/13	MCPA 0.06
		2,4-D 3	24/7/13	MCPA 0.09
			24/7/13	MCPA 0.12
Bridport	13/5/14	MCPA 0.8	13/5/14	MCPA 0.8
Currie			7/8/13	Benzene 0.062
			7/8/13	Chlorothalonil 0.008
			7/8/13	Glyphosate 0.05
			7/8/13	Benzene 0.078
			7/8/13	Chlorothalonil 0.006
			7/8/13	Glyphosate 0.07
			7/8/13	Benzene 0.1
			7/8/13	Chlorothalonil 0.009
			7/8/13	Glyphosate 0.09
			6/11/13	Benzene 0.14
			6/11/13	Benzene 0.18
			5/12/13	Benzene 0.16
			8/1/14	2,4-D 0.003
			8/1/14	Alpha-Cypermethrin 0.06
			8/1/14	Benzene 0.3
			5/3/14	Benzene 0.18
			1/4/14	Benzene 0.18
Deloraine	12/9/13	MCPA 0.2	26/9/13	2,4-D 0.05
	12/9/13	Triclopyr 0.37	17/6/14	2,4-D 0.25
	26/9/13	2,4-D 0.05	25/6/14	2,4-D 0.07
	17/12/13	Picloram 1.07		
	17/12/13	Triclopyr 2.07		
	17/6/14	2,4-D 0.25		
Longford	26/9/13	2,4-D 0.12	26/9/13	2,4-D 0.12
			26/9/13	MCPA 0.27
South Esk	15/8/13	2,4-D	15/8/13	2,4-D 0.17
	15/8/13	Simazine	15/8/13	Simazine 0.12
Tunbridge	13/10/13	MCPA		
West Tamar	15/8/13	Simazine 0.09	15/8/13	Simazine 0.09

Taswater Annual Drinking Water Report - % Makeup of Pesticide Detections



Taswater RTI data % Makeup of Pesticide Detections