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**AN ASSESSMENT OF HEALTH RISKS ASSOCIATED WITH
ENVIRONMENTAL EXPOSURES IN MURCHISON AND CLEMONS
STREETS, ROSEBERY**

**Final Report
27 February 2009**

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Director
Australian Centre for Human Health Risk Assessment (ACHHRA)**

Disclaimers

This report has been prepared for the sole benefit of DHHS for the purpose of assisting DHHS to manage issues relating to contamination claims relating to purported health effects on some residents of the town of Rosebery. It is not intended for use by any other party and neither I nor Monash University will be liable for loss suffered by a third party as a result of reliance upon it.

I have, in preparing this report, relied on documents and information provided by DHHS, its professional advisers and other third parties. No responsibility can be taken by us for any errors or omissions contained in this report which have arisen out of or relate, either directly or indirectly, to the provision of false or misleading information by third persons to me.

The opinions expressed in this report are subject to the following qualifications and assumptions (which I have not taken steps to verify unless stated otherwise in the report):

- all material matters have been included in the information provided by DHHS, its professional advisers and other third parties or brought to my attention by DHHS, its professional advisers and other third parties in response to my inquiries;
- all information provided to us by DHHS, its professional advisers and other third parties has not been misleading and has been accurate and complete without material omission; and
- additional specific qualifications relating to a particular part of the body of this Report.

If any of the above qualifications and assumptions are not correct, the opinions I have expressed will need to be re-examined and may need to be changed.

Executive Summary

This report, along with the interim report dated 17 December 2008 which is appended as Attachment B, were prepared as a result of the Tasmanian Department of Health & Human Services (DHHS) seeking my professional advice on investigations they were making, in conjunction with the Tasmanian Environment Protection Authority (EPA), on concerns raised by residents of three properties in Murchison and Clemons Streets in the town of Rosebery. The investigation was triggered by the resident's concerns that heavy metals in soils and seepage water coming onto their properties resulted in exposure to various heavy metals and metalloids and that these exposures were adversely affecting their health.

In preparing my Reports, I had the opportunity to make a site visit to Rosebery and to review metal concentration data for a range of soil, water, household dust, blood, urine and hair samples. Some of these samples were collected by the EPA while others were collected by the residents or their medical advisors. All the samples appear to have been analysed in NATA-accredited laboratories, although some issues did arise about possible sample contamination and/or laboratory error in relation to urine samples which showed a highly unusual level of cadmium.

I would like to acknowledge the co-operation I have received from all the residents involved in this investigation, although I am aware that for some of them, the level of mistrust they have in the government authorities has made co-operation in the investigations difficult for them.

My Preliminary Report was primarily concerned with evaluating the soil and water samples taken around the properties and considering potential pathways by which resident exposure to metals could occur from these environmental sources. The analytical data revealed levels of metals in some, but by no means all, soil samples which exceeded a health-based guideline (mainly arsenic, manganese and lead). The health-based guideline against which these values were benchmarked was the Health Investigation Level (HIL) established in the *National Environment Protection Measure* (NEPM) for contaminated sites or the 2008 NHMRC *Guidelines for Managing Risks in Recreational Waters*. The highest levels of metals in seepage water were generally associated with those metals which would be expected from the geological characteristics of the region (iron and aluminium). My Preliminary Report emphasised the conservative assumptions inherent in establishing HILs and water quality guidelines, and noted that exceedance of such a guideline in any set of samples did not necessarily indicate that health effects would occur in anyone exposed to those sources.

The Preliminary Report also noted residents' concerns about offensive odours around drains constructed to channel seepage water away from houses and the potential for dusts and toxic airborne pollutants (e.g. H₂S and arsine) to enter their houses. These concerns resulted in recommendations for the EPA to conduct further tests to assess possible airborne exposures. These recommendations including sampling indoor dust and wipes of food preparation surfaces, and airborne levels of H₂S and arsine gas. As things transpired, because the residents withdrew permission for any indoor sampling to be undertaken by the EPA, only sub-floor air sampling for two houses actually occurred. Indoor dust metal levels were referred to me via vacuumed dusts collected

by the residents. In my view, none of the results obtained from soil, dust, water or air (albeit limited) to the time of writing this Report indicates a significant risk of toxic exposures from these sources.

This conclusion is reinforced by the available data from blood, urine and hair samples from residents of the three properties in question in Murchison and Clemons Streets, and to a more limited extent, from blood/urine results from two residents of a neighbouring property. Concentrations of some of the metals of concern in blood and urine are summarised in this Report (Table 1). The overall conclusion is that these biological results do not confirm that any toxicologically significant exposure has occurred for metals such as arsenic, lead, or manganese. There were some results where cadmium levels were above reference ranges (in blood in one resident, and in urine in two residents), although inconsistencies between sequential samples in particular individuals and lack of concordance between blood and urine samples from the same individuals cast some doubt on whether significant cadmium exposures had occurred or its possible environmental source. The issue of possible arsenic exposure was to some extent rationalised by further analysis of urines which initially suggested an elevated level of arsenic excretion in three residents. These further analyses not only showed that total arsenic levels may have been only 47-69% of that originally reported, but speciation showed that it is mainly (88-98%) arsenobetaine, an organic and less toxic form of arsenic commonly found in some food sources (mainly seafood and shellfish).

Two recommendations were formulated for consideration by the DHHS project team as an outcome of my independent evaluation of the matters:

Recommendation 1: Notwithstanding that the measurements of air levels of arsine gas are not yet available, and assuming these results do not raise further concerns, I believe that sufficient information has been gathered in this investigation to draw conclusions about the extent of possible exposure to the heavy metals and metalloids of health concern. **My recommendation is that any further environmental sampling around the properties in question is not warranted.** I am also of the opinion that further biological monitoring would not necessarily be helpful to resolve the issue of whether significant exposure to heavy metals has occurred from sources related to soil and water on these properties.

Recommendation 2: It is noted that all of the residents who have participated in this investigation have concerns about their health. I have been careful not to draw any conclusions about any possible link between the measured levels of metals in the blood or urine of the residents and their health status. **My recommendation is that these health concerns be pursued by appropriate consultation with medical practitioners and that DHHS do whatever it can to facilitate this health follow-up.** However, this follow-up should be based on the premise that the strongly held beliefs of the residents that their health problems are related to heavy metal exposure is not supported by the empirical evidence gathered in this investigation.