



## **Peer review: EnRiskS 2013 report on health & environmental risks associated with the former Chloralkali plant (FCAP)**

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In June 2013, I was invited to peer review a report from Environmental Risk Sciences (EnRiskS) dated 20 June 2013, updating a previous (2008) URS report on a Human Health and Environmental Risk Assessment (HHERA) for soil and groundwater mercury contamination associated with the former ChlorAlkali Plant (FCAP). I had previously (June 2010) provided a peer review of the 2008 report for the Botany Groundwater Community Liaison Committee. At that time, I had provided an overview of the toxicology of mercury and the basis for setting human health exposure standards, but since these matters have been adequately addressed in the 2013 HHERA update, I will confine my comments to the new data and conclusions drawn in the current report.

### **Comment on the EnRiskS 2013 updated HHERA**

The EnRiskS report uses conventional modelling approaches to estimate likely exposures to all forms of mercury and all likely exposure routes. The overall methodology is similar to that used in the 2008 report and identifies predominant risks associated with elemental mercury ( $Hg^0$ ) inhalational exposure pathways from impacted soils and dusts, with some potential exposure associated with extraction and industrial use of contaminated groundwater (noting such use would be subject to licensing agreements). Ingestion and skin contact of contaminated soil by on-site workers was the other potentially significant exposure pathway, most likely to be associated with inorganic and organic forms of mercury.

The risk assessments for mercury under a range of exposure scenarios are expressed in terms of Hazard Index (HI), where the combined exposures are compared with health-based standards, after adjustment for background intake from dietary sources and other sources not specific to the Botany Industrial Park. The effect of adjusting for background is that it permits a much smaller intake from the site-specific sources in the risk assessment.

The approach taken in the EnRiskS HHERA report is consistent with current practice and the report is well written and appropriately detailed. The report uses recently updated enHealth and NEPM guidance on environmental risk assessment, particularly as applied to contaminated sites. It also uses more contemporary Toxicity Reference Values (TRVs) for oral and inhalational intakes. The use of exposure

factors and soil Health Investigation levels (HILs) that have been modified by the enHealth/NEPM processes since the 2008 has resulted in some minor changes to the risk estimates, but the overall conclusions remain the same.

I have not attempted to verify any of the calculations for exposure and HI estimations, but the methodology appears to be sound and all relevant exposure pathways have been considered.

As in the 2008 report, the calculated HIs for assessing off-site mercury exposure via emissions from down-gradient groundwater are comfortably low. The overall HI for total risk is less than 1, with adult risk HI 0.2 and the HI for children around twofold higher at 0.4 – 0.5. These estimates are slightly higher than the 2008 report, and they could reflect either a slightly increased exposure via migration of elemental mercury ( $\text{Hg}^0$ ) in down-gradient groundwater or the use of more contemporary enHealth default exposure factors and more recently set TRVs.

Also, in agreement with the 2008 report, the estimated HIs for chronic on-site worker exposures exceed 1 for some exposure routes, with the risks reflecting higher levels of soil contamination under some specific buildings on the site and projections for different types of activities (e.g. risks for intrusive work practices tend to be higher than those associated with simple occupancy of the buildings). The total onsite building/activity dependent HIs of up to 9 for chronic outdoor/indoor work exposures and up to 24 for intrusive work practices are slightly lower than the total risk HI 35 determined in 2008.

An HI estimate which exceeds 1 does not necessarily imply adverse health effects will occur. The health-based standards from which the HI is calculated incorporate conservative safety margins. However, a calculated HI >1 implies that risks should be managed and attenuated where possible. The EnRiskS report therefore identifies where risk mitigation and risk management processes are needed to avoid worker exposure to such risks.

It is noted that the enRiskS report partially addresses potential offsite exposures for nearby residents and other community activities via measured  $\text{Hg}^0$  emissions to the atmosphere and downwind inhalation exposure. It does this by reference to some site boundary ambient air sampling for  $\text{Hg}^0$  vapours undertaken in a 2009 URS report. Since these measured airborne  $\text{Hg}^0$  concentrations were all well within 2003 WHO air quality guideline value of  $0.2 \mu\text{g}/\text{m}^3$ , they were considered to represent a negligible off-site risk. However, I understand that the NSW EPA has commissioned a more detailed assessment of potential off-site air quality relating to  $\text{Hg}^0$  emissions from the FCAP site, to be undertaken in 2013. This should provide more direct risk estimates for the nearby community.



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