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CHEMICAL AND BIOLOGICAL MONITORING OF CONTAMINATED SITE REMEDIATION IN ANTARCTICA. INFORMING THE PROCESS AND ASSESSING ECOLOGICAL IMPACTS: AN EXAMPLE FROM CASEY, EAST ANTARCTICA

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In the Antarctic summer of 2003/04 Australia began the remediation of an abandoned waste disposal site at Casey Station, East Antarctica. Waste material and contaminated soil were removed via excavation and returned to Australia for appropriate treatment and disposal. During excavation chemical and biological monitoring of removal operations was conducted. We monitored total (X-ray fluorescence spectrometry - XRF) and leachable (toxicity characteristic leaching procedure - TCLP) metal concentrations in soils to assess contamination levels before and during the clean-up, to validate satisfactory remediation of the site and to classify excavated soil and waste for treatment and disposal in Australia. These methods were generally of sufficient sensitivity, accuracy and precision to classify soils for these three purposes.

The excavation process disturbed contaminated materials, potentially increasing the volume and/or diversifying the type of contaminants entrained into summer melt-waters which flow in to the near-shore marine environment adjacent to the site. We used the gammarid amphipod, *Paramoera walkeri*, housed in field mesocosms suspended below the sea ice to monitor the possible short-term impact of the remediation process at potentially impacted marine sites (Brown Bay) and control sites in nearby bays. No differences in mortality were found although post-operation analysis of the heavy metal content of whole *P. walkeri* detected an increase in bioavailable metal contamination in Brown Bay during the excavation process. Monitoring indicated that the clean-up operation was successful in preventing catastrophic impacts. However, a minor disturbance was detected, the ecological implications of which are uncertain.