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The benefits of a remediation scheme at Atlas Cove need to be weighed against any negative effects on plant and animal life.

Atlas Cove, at the northwest end of Heard Island, was the site of the first permanently occupied Australian National Antarctic Research Expeditions (ANARE) station from 1947–55; a precursor to the establishment of bases on the Antarctic continent. Constructed close to the sea on a low-lying area of basaltic lava flows and sand, the station comprised a range of buildings including living quarters, a hospital, stores for food and equipment, workshops, a powerhouse with a diesel generator, fuel caches, and several refuse or tip sites. After its closure, Atlas Cove Station was abandoned to the mercy of the harsh natural forces, visited only occasionally by ANARE.

Between January and February 2000, a major cleanup of the site was initiated by the Australian Antarctic Division (AAD). Most of the remaining structures were demolished and material collected and sorted for disposal in Australia. This was completed the following summer. To determine the extent and intensity of residual chemical contamination within the station area, soil and water samples were collected during the cleanup and analysed in Australia for total petroleum hydrocarbons (TPH) and metallic elements like cadmium, copper, iron, lead, and zinc – derived from batteries, paints, solder, welding materials, machinery, and spilt or burnt fuel.

Chemical concentrations were compared to background levels measured for Atlas Cove and also Australian and New Zealand guidelines for the assessment of contaminated sites and the protection of aquatic and terrestrial ecosystems. Metal contamination was found throughout the station area and there was evidence for its dispersal from the site by water. However, the concentrations of these contaminants are assessed as unlikely to have a toxic impact on local ecosystems. In contrast, contamination by TPH (mainly residues of kerosene and diesel fuel, with small amounts of heavy lubricating oils and greases) was found to be both extensive

and at a level that could potentially exert an impact on the environment. In the most contaminated areas, surrounding the locations of the old powerhouse and fuel caches, TPH concentrations were greater than the environmental investigation guideline set for contaminated urban sites in Australia.

While remediation of metal contaminants at Atlas Cove is not warranted, contamination by TPH requires further investigation, with remedial action assigned high priority should impacts on the biota – the plants, penguins, petrels and seals – be demonstrated. However, the benefits of any proposed remediation scheme at Atlas Cove would need to be weighed against the negative effects this might have on the plant and animal wildlife that have recolonised the old station site since it was abandoned nearly 50 years ago.

One of the applied research goals of the Human Impacts Program at the AAD is to understand and facilitate the *in situ* (on site) remediation of contaminated sites in Antarctica and the subantarctic. Given the logistical difficulties and expense of excavating soil and transporting it to Australia for treatment and disposal, *in situ* remediation is a more practicable, cost-effective and less intrusive option for the cleanup of contaminated sites in these remote regions, especially when petroleum hydrocarbons are the problem. This might involve bioremediation, for example, where natural microbial decomposition is promoted by application of fertilisers or heat. For Atlas Cove, with an estimated 200–600 tonnes of contaminated soil present in an area inhabited by abundant wildlife, *in situ* remediation is a preferable cleanup method.

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