The Chemical Threat

Mercury — A Resurrected Problem

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In 1982, a team of scientists from the Departments of Chemistry and Zoology at Monash University published a study of mercury contamination in the Lerdereg River in Victoria, resulting from old goldmining operations.[1]

Mercury was used almost solely in amalgamation processes to extract gold and silver from ores during early goldmining in the 19th century. Its use ceased for the most part with the invention of the cheaper and more effective cyanidation process, which contributed to a revival of mining in the 1890s. By that time, however, a great deal of mercury had been 'lost to the environment', where, as a liquid heavy metal, it remains in tailings heaps and stream sediments. In the case of the Lerderderg River study, though mercury levels in the water itself were low, concentrations in the sediments were high enough to reach 30 to 700 times the normal background value. At contaminated sites studied, larger river blackfish could contain the highly toxic mercury and its derivative methyl mercury at levels beyond the Victorian Health Department's statutory limit set for mercury in seafood. (Blackfish are bottom feeders and sedentary, increasing the chance of concentration of heavy metals.)

Mercury as a serious toxic pollutant became notorious in the Minamata Bay disaster in Japan, when a factory discharge of mercury into the bay caused a serious outbreak of poisoning with many deaths, and permanent crippling in survivors. To disturb, or rework, stream sediments can, as Dr P.S. Lake put it in a personal communication,[2] "remobilise the sedimented mercury and create a new pollution hazard." As to possible methods of recovering it, these have not been made clear in the available literature. But in an environmental study produced by a NSW firm, Mehilo Pty. Ltd., the proposal was made to separate it from the gold by 'handwashing' and to bottle the mercury for resale. This proposal was described by Dr Lake as "an incredible admission in that it reveals that there must be, in the areas to be mined, an enormous amount of mercury." He points out that "in our work on a *badly contaminated* river (his emphasis), the Lerderderg River near Melbourne, the mercury could not be isolated in such a fashion — its concentration in the sediments was too low, but the concentration was still high enough to give rise to serious contamination."[3] Yet, the Mongarlowe River in which the mining firm wishes to dredge and mine is at present supporting a "rich invertebrate fauna and valuable Macquarie Perch populations" which justify, according to a study carried out over the area proposed to be damned for an additional water supply for Sydney,[4] strong protection from silting, pollution or activities causing change in the quality of the water.

It seems clear then, that over the half-century or so since the use of mercury ended in the Lerderderg catchment, sediments have continued to release mercury and its organic derivative, methyl mercury, into the food chain; while in the case of the Mongarlowe River where mining effectively ceased about 1880, there has been time for the contamination to become more stabilized.

The recent return to prominence of gold mining in Australia which is predicted to increase to the level of, perhaps an achievement for Australian production, of third place in the world[5] * within a few years, has turned the industry's attention to the old fields where new methods of production could result in as much gold being recovered as was taken in the first place. However, the occurrence of great amounts of mercury mixed with, or in proximity to, the recoverable gold, will pose problems for water quality control and for fisheries. Australian gold production has leapt already from 40 tonnes in 1984 to a projected 100 tonnes for 1987. Most if not all old gold fields lie in river valleys and stream catchments. Since water, not gold, is Australia's most precious resource, considerable conflicts loom ahead between water users and miners.

The amount of potential contamination from mercury 'lost to the environment' — as authorities delicately put it, may be estimated from the statement by the scientists concerned in the Lerderderg River study that

> "it has been estimated that the weight of mercury consumed in the amalgamation process is of the same order as the weight of gold recovered . . . For instance, the amount of mercury potentially released to the environment from the Bendigo field, one of the richest early fields in Victoria, would amount of about 900 tonnes."

Mercury, as a factor in the amalgamation process in the extraction of gold, is emerging again after many years during which the cyanidation process was used. At Tennant Creek mine, where Peko-Wallsend has been using mercury in extraction, the firm was recently heavily fined for exposing an immigrant worker to mercury poisoning.[6] The stated attempt to extract and bottle mercury in the case of the New South Wales lease granted to Mehilo Pty Ltd near Mongarlowe, may be the beginning of a major attempt to bring old goldmined areas back into production while hushing up the danger it implies. Water quality, fisheries both commercial and amateur, oyster and other shellfish production, farm water supplies and livestock, and workers exposed to the dangers of mercury contact, may now all be at risk.

Notes:

1. *Mercury Contamination of the Lerderderg River, Victoria, Australia, from an Abandoned Gold Field.* B.M. Bycroft, B.A.W. Coller, G.B. Deacon, D.J. Coleman & P.S. Lake. Environ. Pollut. Ser. A. 0143–1471/82/0028–0135/502.75. Applied Science Publishers Ltd., England, 1982, Printed in Great Britain.
2. Personal communication to Rondale Pty. Ltd., March 1986.
3. Personal communication to Judith Wright McKinney, 30 April 1986.
4. *Welcome Reef Project*, Environmental Study: Aquatic Life. Consultants: Snowy Mountains Engineering Corporation in association with New South Wales State Fisheries. Metrop. Water Sewerage and Drainage Board, Sydney, Feb. 1978.
5. *The Australian Gold Book*, compiled by A.C. Goode & Co., Information Australia, 1986. Available from firm or publisher, $120.
6. 'Damages for mercury poison victim', Andrew Bolt, *The Age*, Tuesday 2 April 1985, p. 6.

* See Financial Review 7 June 1990: Australia now producing 10% of world's gold, expected to rise to 12% this year pre-introduction of gold tax.