

Meeting of Toxicity of Copper from Cables in Enewetak Lagoon

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Attendees: B. W. Wachholz DOE/EV
C. L. Osterberg DOE/EV
T. P. Jeffries DNA 410145
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S. V. Smith U Hawaii
V. Noshkin LLL
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The question had been raised whether the corrosion of the cables on the bottom of the lagoon could result in a toxicity problem to the organisms of the lagoon. If so, DNA would have to remove the cables.

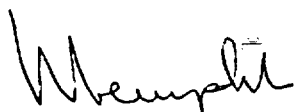
Despite all the tales of the "gold mine" of copper that was present it was clear from the source term data presented by Jeffries that it probably did not exceed 100 tons. The total length was about 263 miles with only 25% of this being heavy power cable, the remainder was telecommunication cable. Most of the cable was in a channel on the east side of the lagoon. Noshkin, who had raised the question, showed some examples of power cable from Runit. The outside covering did contain some radionuclides but these were of no radiological significance. The internal copper material was clean.

The conditions for copper toxicity were discussed. Against ambient levels of 0.2 - 0.6 ug/litre the available data for corals would suggest a level of 2 ug/l having some effect upon corals. Other organisms seem to need 3 - 10 ug/litre to elicit a response. The organism complexing capacity of the seawater was likely to be low.

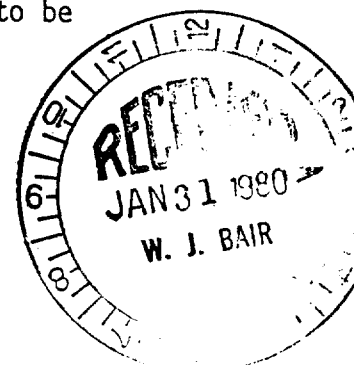
The hydrographic conditions for the cable channel are such that the residence time for the water on the east side of the lagoon is about once a month but near to the southeast pass could be as high as one in a few days.

Consolidation of the facts indicated that the seawater concentration would have to be elevated by 2 to 5 times to reach a level of 1 ppb. In the extreme case if all the copper cable (92 tons) dissolved instantaneously with an average flushing rate of one month it is doubtful if the level would reach 1 - 2 ug/l. However, with a low dissolution rate, e.g., 20 mg/cm²/day, it may take decades for all the copper to go into solution since the insulation will fail at a varying rate, some of the cable will be covered with growing coral and probably protected and some of the cable may be buried in the sediments. Additionally, the cable is located in the area of maximum flushing rate. It is also worthy of note that this area has been subjected to source terms (i.e., copper based antifouling paints designed to dissolve) greater than the present one, when tens of ships anchored there during the tests.

On the basis of the available data the cables presently on the bottom of Enewetak Lagoon do not pose any significant long term threat to the ecological health of the lagoon, and therefore do not need to be removed.



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